West Bengal State Electricity Distribution Company Limited
(A Government of West Bengal Enterprise)
NOTICE INVITING e-TENDER
(Tender Notice No. IT&C/22.10/1564 dtd.08.09.2014)

Chief Enginer (IT&C) , Bidyut Bhavan , 3rd Floor , Bidhanangar, Blaock DJ, Sector-II , Kolkata -91 invites Tender for System Integrator for implementation of Smart Grid pilot project in Siliguri.

Tenders are to be submitted online through the website https://wbtenders.gov.in. The details will be available in https://wbtenders.gov.in from 10.09.2014 onwards. Further details of the Tender Notice may be had from the website of WBSEDCL (www.wbsedcl.in) and the above mentioned office (ph no : 033-23197-263)

Chief Engineer (IT&C)

Bid Document for Appointment of Smart Grid Implementation Agency by WBSEDCL

Tender Reference No. : - WBSEDCL/IT&C/CE/NIT-01(e)/2014-15

Tender Notice No. :- IT&C/22.10/1564 dated 08.09.2014

Volume I

Conditions of Contract

Two Stage – Bidding Procedure

Contents

SECTION 1: INVITATION FOR THE BIDS 4

SECTION 2: INSTRUCTIONS TO BIDDERS 7

SECTION 3: BID DATA SHEET 48

SECTION 4: GENERAL CONDITIONS OF CONTRACT (GCC) 53

SECTION 5: SPECIAL CONDITIONS OF CONTRACT (SCC) 119

SECTION 6: SAMPLE FORMS & PROCEDURES 1295

SECTION 7: SCOPE OF WORK 150

SECTION 8: GUIDELINES FOR TECHNICAL PROPOSAL 155

SECTION 9: EVALUATION METHODOLOGY 159

Section-1

Section 1: Invitation for the Bids

Tenders are invited by the Chief Engineer, IT&C Cell, WBSEDCL, Vidyut Bhaban (3rd. Floor), Bidhannagar, Block-DJ, Sector-II, Kolkata-91 through electronic tendering (e-tendering) for selection of System Implementation Agency for Implementation of Smart Grid Pilot Project with AMI for Residentia and Industrial Consumer and PLM functionality in Siliguri area.

1.1 About this document

The purpose of this document is selection of Smart Grid Implementation Agency (SGIA) for the "Employer".

Bidders are advised to study this document carefully. Submission of RFP shall be deemed to have been done after careful study and examination of this document with full understanding of its implications. This RFP document is not transferable. This document must be read in its entirety. Please verify that you have a complete copy.

1.2 The Opportunity

Employer intends to develop Smart Grid elements in to its Distribution System &Process and has selected works to be executed under the current Program through Smart Grid Implementation Agency (SGIA).

The SGIA would supply, install and commission the equipment and systems described under the Specifications.

1.3 Calendar of Events : Schedule of Dates for e-Tendering:

Event	Scheduled Date &Time
Publishing Date	10.09.2014
Document Download start date	11.09.2014 at 11 :00 AM
Last date of Receiving Pre-Bid Clarification	19.09.2014 at 3:00 PM
Date of Pre-bid Meeting	26.09.2014 at 11:00 AM
First Stage Bid submission Start date	10.10.2014 at 11:00 AM
First Stage Bid submission last date	14.10.2014 at 02:00 PM
Last date of physical submission of Tender Fee	14.10.2014 at 12:00 PM
1st. stage Bid opening date	17.10.2014 at 03:00 PM
2nd. Stage Bid Submission	**To be intimated after evaluation of 1st Stage Bid**

Intending bidders desirous of participating in the tender are to log on to the website https://wbtenders.gov.in for the tender. The tender can be searched by typing WBSEDCL in the search engine provided in the website.

Bidders willing to take part in the process of e-tendering are required to obtain Digital Signature Certificate (DSC) in the name of person who will sign the tender, from any authorized Certifying Authority (CA) under CCA, Govt of India (viz. nCode Solution, Safescrypt, e-Mudhra). DSC is given as a USB e-Token. After obtaining the Class 2 or Class 3 Digital Signature Certificate (DSC) from the approved Certifying Authority they are required to register the fact of possessing the Digital Signature Certificates through the registration system available in the website.

Tenders are to be submitted online and intending bidders are to download the tender documents from the website stated above, directly with the help of the e-Token provided. This is the only mode of collection of tender documents. Details of submission procedure are given in “Instructions to Bidders”.

1.4 Sections in the RFP Document

Section	Content	Page Number
Section 1	Invitation for Bids	4
Section 2	Instructions to Bidders	7
Section 3	Bid Data Sheet	47
Section 4	General Conditions of Contract	53
Section 5	Special Conditions of Contract	119
Section 6	Sample Form & Procedures	125
Section 7	Scope of Work	150
Section 8	Guidelines for Technical Proposal	151
Section 9	Evaluation Methodology	155

Section-2

2 Instructions to Bidders

2.0 Preamble

This section (Section –II) of the Bidding Documents provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Employer. It also provides information on bid submission, opening and, on contract award.

This Section (Section II) contains provisions that are to be used unchanged unless Section III, which consists of provisions that supplement, amend, or specify in detail, information or requirements included in Section II and that are specific to each procurement, states otherwise. If there is a conflict between the provisions of Section – II & Section –III, the provisions of Section – III shall prevail.

Further in all matters arising out of the provisions of this Section – II and the Section – III of the Bidding Documents, the laws of the Union of India shall be the governing laws and Calcutta High Court shall have exclusive jurisdiction.

2.1 : **General guidance for e-Tendering :**

Instructions/Guidelines for electronic submission of the tenders have been mentioned below for assisting the bidders to participate in e-Tendering.

2.2. Registration of bidder :

Any bidder willing to take part in the process of e-Tendering will have to be enrolled & registered with the e-Procurement system, through logging on to https://wbtenders.gov.in.

2.3. Digital Signature certificate (DSC) :

Each bidder is required to obtain a class-II or Class-III Digital Signature Certificate (DSC) for submission of tenders.

2.4. The bidder can search and download NIT & Tender Documents electronically from the website mentioned in Clause 4 using the Digital Signature Certificate. This is the only mode of collection of Tender Documents.

A. Introduction

1. Source of Funds

1.1 The Employer intends to use domestic funding (Internal Resources/Domestic Borrowings/Bonds/GOI Grants) for this Project.

All eligible payments under the contract(s) for the package for which this Invitation for Bids is issued shall be made by the Employer, named in the **BDS.**

2. Eligible Bidders

2.1 This Invitation for Bids, issued by the Employer is open to all firms including company (ies), Government owned Enterprises registered and incorporated in India as per Companies Act, 1956, barring Government Department as well as foreign and those bidders with whom business is banned by the Employer.

2.2 Bidders shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

i. they have a controlling partner in common; or

ii. they receive or have received any direct or indirect subsidy from any of them; or

iii. they have the same legal representative for purposes of this bid; or

iv. they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or

v. a Bidder submits more than one bid in this bidding process, either individually [including bid submitted as a agent/authorised representative on behalf of one or more manufacturer(s) or through Licensee – Licensor route, wherever permitted as per the provision of Qualification Requirement for the Bidders in Annexure – A (BDS)] or as a partner in a joint venture, except for alternative offers permitted under ITB Clause 9.3. This will result in the disqualification of all such bids. However, this does not limit the participation of a Bidder as a subcontractor in another bid, or of a firm as a subcontractor in more than one bid; or

vi. a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the Plant and Installation Services that are the subject of the bid; or

vii. A Bidder or any of its affiliates has been hired (or is proposed to be hired) by the Employer as Project Manager for the contract.

2.3 The Bidder, directly or indirectly shall not be a dependent agency of the Employer.

3. Eligible Plant, Equipment, and Services

3.1 For the purposes of these Bidding Documents, the words "facilities," "plant and equipment," "installation services," etc., shall be construed in accordance with the respective definitions given to them in the General Conditions of Contract.

3.2 All plant and equipment to be supplied and installed and services carried out under the contract shall have their origin in any country barring those countries against whom sanction for conducting business is imposed by Government of India and barring those firms with whom business is banned by the Employer.

3.3 For purposes of this clause, "origin" means the place where the plant and equipment or component parts thereof are mined, grown, or produced. Plant and equipment are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

3.4 The origin of the plant, equipment, and services is distinct from the nationality of the Bidder.

4. Cost of Bidding

4.1 The Bidder shall bear all costs associated with the preparation and submission of its bid including post-bid discussions, technical and other presentations etc., and the Employer will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

4.2 **Cost of Bid Document**:

Interested Vendor is to submit the Cost of the Tender Document of INR 12,000 in the form of crossed Bank Demand Draft / Pay Order drawn in favour of "West Bengal State Electricity Distribution Company Limited" payable at Kolkata on any Scheduled Bank during Bid Submission as per time schedule mentioned.

Issuance of bidding documents shall not automatically construe that the bidder fulfils all the Qualifying Requirements which shall be determined during different stages of bid evaluation based on data/documents submitted by the bidder.

B. The Bidding Documents

5. Content of Bidding Documents

5.1 The facilities required, bidding procedures, contract terms and technical requirements are prescribed in the Bidding Documents. The Bidding Documents comprise of the following and shall include amendments, if any, thereto:

VOLUME – I: Conditions of Contract

Section 1	Invitation for Bids (IFB)
Section 2	Instructions to Bidders (ITB)
Section 3	Bid Data Sheet (BDS)
Section 4	General Conditions of Contract (GCC)
Section 5	Special Conditions of Contract (SCC)

Attachment Folder :-	Sample Forms and Procedures (FP)
Qualification Folder :-	Qualifying Requirements
Technical Specification Folder :-	Scope of Work
Guidelines for Technical Proposal :	Guidelines for Technical Proposal
Evaluation Methodology :	Evaluation Methodology

Volume-II:	Technical Specification
Volume-III:	Price Schedule

5.2 The Bidder is expected to examine all instructions, forms, terms, specifications and other information in the Bidding Documents. Failure to furnish all information required by the Bidding Documents or submission of a bid not substantially responsive to the Bidding Documents in every respect will be at the Bidder's risk and may result in rejection of its bid.

5.3 Scope of Work is given in Scope of Work Folder of Bidding Documents which refers to the document (Volume-II) titled "Technical Specifications for AMI and PLM System".

6. Clarification of Bidding Documents; and Pre-Bid Meeting

6.1 A prospective Bidder requiring any clarification of the Bidding Documents may notify the Employer in writing or by cable (hereinafter, the term cable is deemed to include Electronic Data Interchange (EDI), telex or telefax) at the Employer's mailing address indicated in the **BDS**. Similarly, if a Bidder feels that any important provision in the documents, such as those listed in ITB Sub-Clause 9.2(e) will be unacceptable; such an issue should be raised as above. The Employer will respond in the pre bid meeting for clarification or modification of the Bidding Documents received before the designated date of pre-bid. The Employer shall not be obliged to respond to any request for clarification received later than the above period. Further, the mere request for clarification from the Bidders shall not be a ground for seeking extension in the deadline for submission of bids. Any clarification/modification of the bid (including an explanation of the query but not identification of its source) will be uploaded in the website of the Employer.

6.2 The Bidder is advised to visit and examine the site where the facilities are to be installed and its surroundings and obtain for itself on its own responsibility and cost all information that may be necessary for preparing the bid and entering into a contract for supply and installation of the facilities. The costs of visiting the site shall be at the Bidder's own expense.

6.3 The Bidder and any of its personnel or agents will be granted permission by the Employer after obtaining written request from the Bidder to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the

Bidder, its personnel and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of the inspection.

6.4 The Bidder's designated representative(s) (maximum two persons per Bidder) is/are invited to attend a pre-bid meeting, which, if convened, will take place at the venue and time stipulated in the **BDS**. The purpose of the meeting will be to clarify any issues regarding the Bidding Documents in general and the Technical Specifications in particular. The Bidder is requested, as far as possible, to submit any question in writing, to reach the Employer not later than one week before the meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted as indicated hereafter. Minutes of the meeting, including the text of the questions raised (without identifying name of the bidders) and the responses given, together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the Bidding Documents. Any modification of the Bidding Documents listed in ITB Sub-Clause 5.1, which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to ITB Clause 7 and not through the minutes of the pre-bid meeting.

Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder but at the same time shall not entitle to raise any query at a later date.

7. Amendment of Bidding Documents

7.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative, or in response to a clarification requested by a prospective Bidder, amend the Bidding Documents.

7.2 The amendment will be notified in writing or by cable or in WBSEDCL's website to all prospective bidders who have purchased the Bidding Documents and will be binding on them. Bidders are required to immediately acknowledge receipt of any such amendment, and it will be assumed that the information contained therein will have been taken into account by the Bidder in its bid.

7.3 In order to afford reasonable time to the prospective Bidders to take the amendment into account in preparing their bid, the Employer may, at its discretion, extend the deadline

for the submission of bids, in such cases; the Employer will notify all bidders in writing or by notice in website of WBSEDCL of the extended deadline.

C1. First Stage Bids: Preparation

8. Language of Bid

8.1 The bid prepared by the Bidder and all correspondence and documents exchanged by the Bidder and the Employer related to the bid shall be written in the English language, provided that any printed literature furnished by the Bidder may be written in another language, as long as such literature is accompanied by English translation of its pertinent passages, in which case, for purposes of interpretation of the bid, the English translation shall govern.

9. Documents Comprising the Bid

9.1 The First Stage bid submitted by the Bidder shall comprise of the following documents:

Bid Form – First Stage duly completed and signed by the Bidder, together with all Attachments identified in ITB Sub-Clause 9.2 below.

First Stage bids are technical bids and shall contain no prices or price schedules or other reference to rates and prices for completing the facilities. First Stage bids containing such price information will be rejected.

9.2 Attachments to the First Stage bid: (Check Attachment Folder)

Each Bidder shall upload the scanned copy of the following attachments with its First Stage bid:

(a) Attachment 1A :- Cost of the Tender Document of INR 12,000 in the form of crossed Bank Demand Draft / Pay Order / Banker's Cheque drawn in favour of "West Bengal State Electricity Distribution Company Limited" payable at Kolkata on any Scheduled Bank during Bid Submission as per time schedule mentioned.

(b) Attachment 1B: Power of Attorney

A power of attorney, duly notarized, indicating that the person(s) signing the bid has (ve) the authority to sign the bid and thus that the bid is binding upon the Bidder.

(c) Attachment 2: Bidder's Eligibility and Qualifications

In the absence of prequalification, documentary evidence establishing that the Bidder is eligible to bid in accordance with ITB Clause 2 and is qualified to perform the contract in accordance with **Annexure – A(BDS)**, if its bid is accepted.

The documentary evidence of the Bidder's eligibility to bid shall establish to the Employer's satisfaction that the Bidder, at the time of submission of its bid, is eligible as defined in ITB Clause 2.

The documentary evidence of the Bidder's qualifications to perform the contract, if its bid is accepted, shall establish to the Employer's satisfaction that the Bidder has the financial, technical, production, procurement, shipping, installation and other capabilities necessary to perform the contract, and, in particular, meets the experience and other criteria outlined in the Qualification Requirement for the Bidders in **Annexure – A (BDS)** and shall also include:

The complete annual reports together with Audited statement of accounts of the company for last five years of its own (separate) immediately preceding the date of submission of bid.

[**Note I**. In the event the Bidder is not able to furnish the above information of its own (i.e., separate), being a subsidiary company and its accounts are being consolidated with its Group/ Holding/ Parent company, the Bidder should submit the audited balance sheet, income statement, other information pertaining to it only (not of its Group/Holding/Parent company) duly certified by any one of the authority [(i) Statutory Auditor of the Bidder/(ii) Company Secretary of the Bidder a (iii) A certified Public Accountant] certifying that such information/documents are based on the audited accounts as the case may be.

Note II. Similarly, if the Bidder happens to be a Group/Holding/ Parent company, the Bidder should submit the above documents/information of its own (i.e., exclusive of its subsidiaries) duly certified by any one of the authority mentioned

in Note I above certifying that these information/documents are based on audited accounts, as the case may be.]

Unless otherwise mentioned in **BDS**, bids submitted by a joint venture of two or more firms as partners, if allowed as per stipulated Qualification Requirements in Annexure-A (BDS), mentioned in Qualification Folder shall comply with the following requirements:

(i) The bid shall include all the information required for Attachment 2 as described above for each joint venture partner.

(ii) The bid shall be signed so as to be legally binding on all partners.

(iii) One of the partners responsible for performing a key component of the contract shall be designated as leader, this authorization shall be evidenced by submitting with the bid a power of attorney signed by legally authorized signatories.

(iv) The leader shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture, and the entire execution of the contract, including payment, shall be done exclusively with the leader, provided otherwise requested by the joint venture and agreed between the Employer and the leader.

(v) The Lead Partners of the consortium shall be liable for the entire contract in accordance with the contract terms, while other Consortium Members shall be liable severally for their portion of Work.

(vi) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid including interalia delineation of responsibilities and obligations of each partners appended thereto, notwithstanding the joint and several liability.

(vii) The joint venture agreement should indicate precisely the responsibility of all members of JV in respect of planning, design, manufacturing, supply, installation, commissioning and training. All members of JV should have active participation in execution during the currency of the contract. This should not be varied/modified subsequently without prior approval of the employer; and

In order for a joint venture to qualify, each of its partners or combination of partners must meet the minimum criteria listed in the Qualification Requirement for the Bidder in enclosed Annexure-A(BDS) for an individual Bidder for the component of the contract they are designated to perform. Failure to comply with this requirement will result in rejection of the joint venture bid.

A firm can be a partner in only one joint venture; bids submitted by joint ventures or consortia including the same firm as partner will be rejected.

In the case of a Bidder who offers to supply and/or install plant and equipment under the contract that the Bidder did not manufacture or otherwise produce and/or install, the Bidder shall (i) have the financial and other capabilities necessary to perform the contract; (ii) have been duly authorized by the manufacturer or producer of the related plant and equipment or component as per proforma in Attachment 16 to supply and/or install that item in the Employer's country; and (iii) be responsible for ensuring that the manufacturer or producer complies with the requirements of ITB Sub-Clause 3.2 and meets the minimum criteria listed for an individual Bidder for that item.

(d) Attachment 3: Eligibility and Conformity of the Facilities

Documentary evidence established in accordance with ITB Clause 3 that the facilities offered by the Bidder in its bid are eligible and conform to the Bidding Documents.

The documentary evidence of the eligibility of the facilities shall consist of a statement on the country of origin of the plant and equipment offered, which shall be confirmed by a certificate of origin issued at the time of shipment.

The documentary evidence of the conformity of the facilities to the Bidding Documents may be in the form of literature, drawings and data, and shall furnish:

(i) A detailed description of the essential technical and performance characteristics of the facilities;

(ii) A list giving full particulars, including available sources, of all spare parts, special tools, etc., necessary for the proper and continued functioning of the facilities for a period as Specified in Technical Specifications

following completion of facilities in accordance with provisions of contract; and

(iii) A commentary on the Employer's Technical Specifications and adequate evidence demonstrating the substantial responsiveness of the facilities to those specifications. Bidders shall note that standards for workmanship, materials and equipment designated by the Employer in the Bidding Documents are intended to be descriptive (establishing standards of quality and performance) only and not restrictive. The Bidder may substitute alternative standards, brand names and/or catalog numbers in its bid, provided that it demonstrates to the Employer's satisfaction that the substitutions are substantially equivalent or superior to the standards designated in the Technical Specifications.

(iv) All details regarding after sale service support offered.

(v) All details regarding proposed training for Employer's personnel.

(vi) Detailed answers to all the Questions in the Questionnaire, if prescribed in the bidding document.

(vii) Details establishing the responsiveness of the offer in accordance with Technical Specification, Volume-II.

(e) Attachment 4: Subcontractors Proposed by the Bidder

The Bidder shall include in its bid details of all major items of supply or services that it proposes to purchase or sublet, and shall give details of the name and nationality of the proposed Subcontractor, including vendors, for each of those items. Bidders are free to list more than one Subcontractor against each item of the facilities.

The Bidder shall be responsible for ensuring that any Subcontractor proposed complies with the requirements of ITB Clause 2, and that any plant, equipment or services to be provided by the Subcontractor comply with the requirements of ITB Clause 3 and Qualification Requirement for the Bidder, enclosed as **BDS** and Qualification Requirement for subcontractors or Sub-vendors given in Technical Specification, Volume-II.

The Employer reserves the right to delete any proposed subcontractor from the list prior to or during clarification meeting with the Bidder, pursuant to ITB Clause 18 and ITB Sub-Clause 9.2(e).

(f) Attachment 5: Deviations

Bidders shall give details of deviations, objections or reservations, , from the requirements of the Bidding Documents, that they would like the Employer to consider during the clarification meeting with the Bidder, pursuant to ITB Clause 18. In particular, deviations from, objections to or reservations, if any, about critical provisions such as those concerning Bid Security (ITB Clause 24); GCC Clauses 2.14 (Governing Law), 8 (Terms of Payment), 9.2 (Performance Security), 10 (Taxes and Duties), 21.2 (Completion Time Guarantee), 22 (Defect Liability), 23 (Functional Guarantees), 25 (Patent Indemnity), 26 (Limitation of Liability), 38 (Settlement of Disputes), 39 (Arbitration); and related prescriptions in the Bidding Documents, shall be explained. The Employer will consider all deviations, pursuant to ITB Clause 16. Those accepted by the Employer will be incorporated either as an amendment to the Bidding Documents, or into the "**Changes Required Pursuant to First Stage Evaluation**", pursuant to ITB Clause 19. The deviations that will not be accepted by the Employer shall be withdrawn by the Bidder in its Second Stage bid, failing which, the bid will be rejected, pursuant to ITB Sub-Clause 32.5.

Bidder may further note that except for the deviations listed in Attachment-5, the First Stage Bid shall be deemed to comply with all the requirements in the Bidding Documents and the Bidders shall be required to comply with all such requirements of Bidding Documents and Technical Specifications irrespective of any mention to the contrary, any where else in the bid.

(g) Attachment 6: Answers to Questionnaire

(h) Attachment 7: Work Completion Schedule

(i) Attachment 8: Guarantee Declaration

(j) Attachment 9: Information regarding ex-employees of Employer in Bidder's firm.

(k) Attachment 10: Information for E-payment, PF details and declaration regarding Micro/Small & Medium Enterprises

(i) Attachment 11: Additional Information

(i) Certificate from their Banker(s) indicating various fund based/non fund based limits sanctioned to the Bidder and the extent of utilization as on date. Such certificate should have been issued not earlier than three months prior to the date of bid opening. Wherever necessary the Employer may make queries with the Bidders' Bankers.

(ii) Detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder or any partner of JV may result in rejection of Bid.

(iii) Any other information which the Bidder intends to furnish.

(m) Schedule – 1: Bill of Quantity (BOQ) (unpriced)

(n) All other enclosures required to be submitted as per Technical Specification.

10. Bid Form

10.1 The Bidder shall complete the First Stage Bid Form furnished in the Bidding Documents in the manner and detail indicated therein and submit the same with its first stage bid.

11. Format and Signing of Bid

11.1 The bid shall contain no alterations, omissions or additions, unless such corrections are initialed by the person or persons signing the bid.

11.4 The Bidder shall furnish information as described in the last paragraph of the Form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this bid, and to contract execution if the Bidder is awarded the contract.

C2. First Stage Bids: Submission

12. Uploading of First Stage Bids

Tenders are to be submitted online through the website https://wbtenders.gov.in. All the documents uploaded by the Tender Inviting Authority form an integral part of the contract. Bidders are required to upload all the tender documents along with the other documents, as asked for in the tender, through the above website within the stipulated date and time as given in the Tender. Tenders are to be submitted in single folders - Technical Proposal. The tenderer shall carefully go through the documents and prepare the required documents and upload the scanned documents in Portable Document Format (PDF) to the portal in the designated locations of Technical Bid.

The bidder needs to download the Attachments, fill up the particulars in the designated Cell and upload the same in the designated location of Technical Bid.

The documents uploaded shall be virus scanned and digitally signed using the Digital Signature Certificate (DSC). Tenderers should take note of all the addendum/corrigendum related to the tender and upload the latest documents as part of the tender.

12.1 The First Stage Bid shall contain scanned copies and/or declarations in the following standardised formats in separate folders.

a) To be submitted in "Attachment" folder : All the attachments mentioned previously should be uploaded in the attachment folder.

b) **To be submitted in "Qualification" folder** : All documentary evidence in support of the qualifying requirement stipulated as above.

c) **"Guideline for Technical proposal" folder :** All documentary evidence in support of the technical proposal proposed by the Bidder.

d) "**Unpriced Price Schedule" folder** :- This folder contains the unpriced Price Schedule as per Volume III of the RFP document. First Stage bids are technical bids and bidder shall not be required to submit any rates and prices for completing the facilities. First Stage bids containing such price information will be rejected.

12.2 Submission **of original copies of documents of Tender Fee:**

i. ***Mode of Payment****:* Tender Fee must be submitted in the form of Bank Draft (DD) / Bankers Cheque (BC) of any scheduled Bank of India. Payment in any other form will not be accepted.

ii. **Place of submission***:* The original copies of the DD/BC/, towards Tender Fee and Earnest Money Deposit shall be submitted in the following office:
Office of the Chief Engineer,
IT & Communication Cell,
West Bengal State Electricity Distribution Company Limited,
Vidyut Bhavan, 3rd. Floor, D-Block, Bidhannagar,,Kolkata – 700091.

iii. **Time of submission**: The original copies of DD/BC towards Tender Fee shall be submitted in a sealed envelope in the office as stated above within the date and time as specified in the NIT. If the bidder fails to submit the original copies within the due date and time his tender will not be opened and his bid will stand rejected.

13. Deadline for Submission of Bids

13.1 First Stage bids must be uploaded at the website specified under ITB and no later than the time and date stated in the **BDS**. Late bids will be rejected. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the bids will be uploaded upto the appointed time on the next working day..

13.2 The Employer may, at its discretion, extend this deadline for submission of bids by amending the Bidding Documents in accordance with ITB Sub-Clause 7.3 for the reasons specified therein, in which case all rights and obligations of Employer and bidders will thereafter be subject to the deadline as extended.

C3. First Stage Bids: Opening and Evaluation

14. Opening of First Stage Bids by Employer

14.1 First Stage bids will be opened by the Employer or his authorised representative electronically from the website stated above, using their Digital Signature Certificate. Interested bidders' designated representatives may choose to attend

14.2 Technical proposals for those tenders whose original copies of DD/BC towards tender fee have been received will only be opened. Proposals corresponding to which original copy of DD/BC towards tender fee has not been received, will not be opened and will stand rejected . No bid shall be rejected at bid opening except for late bids pursuant to ITB Clause 13.1 and bid not accompanied by cost of tender document.

Decrypted (transformed into readable formats) documents of all the folders will be downloaded for the purpose of evaluation.

14.3 The Employer may prepare minutes of the bid opening.

15. Preliminary Examination of First Stage Bids

15.1 The Employer will examine the bids to determine whether they are complete, whether the documents have been properly signed and whether the bids are generally in order. Any bids found to be nonresponsive or not meeting the minimum levels of the performance or other criteria specified in the Bidding Documents will be rejected by the Employer and not included for further consideration.

16. Technical Evaluation of First Stage Bid

16.1 The Employer will carry out a detailed evaluation of the bids in order to determine whether the technical aspects are substantially responsive to the requirements set forth in the Bidding Documents. In order to reach such a determination, the Employer will examine the information supplied by the bidders, pursuant to ITB Clause 9, and other requirements in the Bidding Documents, taking into account the following factors:

(a) overall completeness and compliance with the Technical Specifications and Drawings; the technical merits of alternatives offered and deviations from the Technical Specifications; suitability of the facilities offered in relation to the environmental and climatic conditions prevailing at the site; quality, function and operation of any process control concept included in the bid

(b) achievement of specified performance criteria by the facilities

(c) compliance with the time schedule offered by bidders, as evidenced by a milestone schedule provided in the bid

(d) type, quantity, and long-term availability of spare parts and maintenance services

(e) any other relevant technical factors that the Employer deems necessary or prudent to take into consideration

(f) any deviations to the commercial and contractual provisions stipulated in the Bidding Documents.

(g) Details furnished by the bidder in response to the requirements specified in Volume-II of the Bidding Documents.

17. Qualification

17.1 In the absence of prequalification, the Employer will ascertain to its satisfaction whether bidders determined as having submitted responsive First Stage bids are qualified, as per the Qualification Requirement specified in Annexure – A (BDS) (Qualification Folder) to satisfactorily perform the contract. The Employer shall be the sole judge in this regard and the Employer's interpretation of the Qualification Requirement shall be final and binding.

17.2 The determination will take into account the Bidder's financial, technical capabilities including production capabilities and past performance. It will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB Sub-Clause 9.3 (c), as well as such other information as the Employer deems necessary and appropriate.

17.3 An affirmative determination will be a prerequisite for the Employer to invite the Bidder to a clarification meeting in accordance with ITB Clause 18. A negative determination will result in rejection of the Bidder's bid.

17.4 The Employer may waive any minor informality, nonconformity or irregularity in a bid that does not constitute a material deviation, affecting the capacity and capability of the Bidder to perform the Contract.

D. Clarification Meeting

18. Clarification of First Stage Bids and Review of Bidders' Proposed Deviations

18.1 The Employer may conduct Clarification Meetings with and/or seek clarification from each or any Bidder to clarify any aspects of its First Stage bid that require explanation at this stage of the evaluation. During these meetings, the Employer may bring to the attention of the Bidder any matters, technical or otherwise, where for whatever reason, it requires amendments or changes to be made to the First Stage bid. All such amendments or changes required by the Employer will be listed in an Annex to the Memorandum documenting the clarification meeting entitled "**Changes Required Pursuant to First Stage Evaluation**" and will be formally notified to the Bidder as part of the invitation to submit the Second Stage Bid or prior to that. Conducting Clarification Meetings or seeking clarifications shall solely be the prerogative of and at the discretion of the Employer and this provision for such Clarification Meeting or seeking clarification does not confer any right, whatsoever, on the Bidder to demand the same.

18.2 The Employer will advise the Bidder of any exceptions or deviations in the First Stage bid, pursuant to ITB Sub-Clause 9.2, that are unacceptable and that are to be withdrawn in the Second Stage bid, and of such exceptions or deviations that the Employer finds acceptable.

19. Invitation to Submit Second Stage Bids

19.1 At the end of the First Stage evaluation and after holding clarification meetings,

(a) the Employer may issue an amendment to the Bidding Documents modifying, inter alia and as needed, the evaluation criteria or other sections of the Instructions to Bidders, the Special Conditions of Contract, and the Technical Specifications resulting from the First Stage evaluation and clarification meetings, with the objective of improving competition without compromising essential project objectives and/or

(b) The Employer will either

(i) invite a Bidder to submit Second Stage bid alongwith or after, an updated technical First Stage bid based on the updated Technical Specifications and Drawings and any other technical revisions required for the original First Stage bid as recorded in the Annex to the Memorandum entitled "Changes Required Pursuant to First Stage Evaluation" of the clarification meeting or any other changes that the Employer may require (such updation, at Employer's discretion may also be by way of the Bidder's confirmation of

compliance to the "Changes Required Pursuant to First Stage Evaluation" and/or any other changes that the Employer may require), or

or

(ii) notify a Bidder that its bid has been rejected on the grounds of being substantially nonresponsive, or that the Bidder does not meet the minimum qualification requirements set forth in the Bidding Documents.

19.2 Bidders are not allowed to form joint venture(s) or consortium (consortia) with other bidders, nor change the partner or structure of the joint venture or consortium if the Bidder in the First Stage was a joint venture or consortium.

19.3 The deadline for submission of Second Stage bids will be specified in the invitation to submit Second Stage bids.

E1. Second Stage Bids: Preparation

20. Documents Comprising the Second Stage Bid

20.1 When submitting the Second Stage bid in accordance with ITB Part E2 (Second Stage Bids: Submission) of these Instructions to Bidders, the documents to be submitted are the following:

(a) Updated First Stage Bid, as applicable, pursuant to ITB Sub-Clause 19.1(b);

(b) The **commercial (Price) bid**, consisting of

(i) Bid Form—Second Stage duly completed and signed by Bidder, together with all Attachments identified in subparagraph (d) below

(ii) Price Schedules duly completed by the Bidder;

(c) Attachments to the Second Stage bid:

(i) Attachment 1: Bid Security

A bid security furnished in accordance with ITB Clause 24.

(ii) Attachment 2: Power of Attorney

A power of attorney, duly notarized, indicating that the person(s) signing the bid has(ve) the authority to sign the bid and thus that the bid is binding upon the Bidder during the full period of its validity, in accordance with ITB Clause 25.

(iii) Attachment 3: Bidder's Eligibility and Qualifications

Any changes that may have occurred between the time of submitting the First and Second Stage bids that have any material effect on the Bidder's eligibility and qualifications to perform the Contract.

(iv) Attachment 4: Eligibility and Conformity of the Facilities

Documentary evidence established in accordance with ITB Clause 3 that any additional or varied facilities to be supplied and installed by the Bidder, in accordance with the requirements of the "Changes Required Pursuant to First Stage Evaluation" and/or any other changes that the Employer may require, are eligible.

The documentary evidence of the eligibility of the additional facilities shall consist of a statement on the country of origin of the plant and equipment offered, which shall be confirmed by a certificate of origin issued at the time of shipment.

The documentary evidence of the conformity of the facilities to the requirements of the "Changes Required Pursuant to First Stage Evaluation" and/or any other changes that the Employer may require may be in the form of literature, drawings and data.

(v) Attachment 5: Subcontractors proposed by the Bidder

If the Bidder proposes to engage any Subcontractors additional to those named in its First Stage bid, it shall give details of the name and nationality of the proposed Subcontractor, including vendors, and the part of the facilities it proposes subletting to them or purchasing from them. Bidders are free to list more than one Subcontractor against each item of the facilities.

Quoted rates and prices will be deemed to apply to whichever Subcontractor is appointed, and no adjustment of the rates and prices will be permitted.

The Employer reserves the right to delete any proposed Subcontractor from the list prior to award of contract, and after discussion between the Employer and the Contractor.

(vi) Attachment6: Guarantee Declaration

(viii) Attachment 7: Information regarding ex-employees of Employer in Bidder's firm.

(ix) Attachment 8: Information for E-payment, PF details and declaration regarding Micro/Small & Medium Enterprises

21. Bid Form and Price Schedules

21.1 The Bidder shall complete the Bid Form—Second Stage and the appropriate Price Schedules furnished in the Bidding Documents in the manner and detail indicated therein, following the requirements of ITB Clauses 22 and 23.

22. Bid Prices

22.1 Unless otherwise specified in the Technical Specifications, bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in, or to be reasonably inferred from, the Bidding Documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the facilities. This includes all requirements under the Contractor's responsibilities for the testing, precommissioning and commissioning of the facilities including supply of mandatory spares (if any), and where so required by the Bidding Documents, the acquisition of all permits, approvals and licenses, etc., operation, maintenance and training services and such other items and services as may be specified in the Bidding Documents, all in accordance with the requirements of the General Conditions of Contract. Items against which no price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed to be covered by the prices for other items.

22.2 Bidders shall give a breakdown of the prices in the manner and detail called for in the Price Schedules. Where no Price Schedules are included in the Bidding Documents, bidders shall present their prices in the following manner:

Separate numbered Schedules shall be used for each of the following elements. The total amount from each Schedule 1 to 5 shall be summarized in a grand summary of Price Proposal (Schedule 6) giving the total bid price(s) to be entered in the Bid Form.

Schedule 1 : Plant and Equipment to be supplied

Schedule 2 : Local Transportation, Insurance and other incidental services applicable for supply of Plant & Equipment

Schedule 3 : Installation Services

Schedule 4a : Break-up of Training Charges for Training to be imparted

Schedule 4b : Break-up of Annual Maintenance Charges

Schedule 5 : Taxes and Duties not included in Schedule 1 to 4

Schedule 6 : Grand Summary (Schedule Nos. 1 to 5)

Schedule 7 :

Bidders shall note that the plant and equipment included in Schedule No. 1 above exclude materials used for civil, building and other construction works. All such materials shall be included and priced under Schedule No. 3, Installation Services.

22.2.1 The bid price for (i) the items for which quantities have been indicated as lumpsum or lot or set and/or (ii) where the quantities are to be estimated by the Bidder shall remain constant unless there is change made in the Scope of Work by Employer. The quantities and unit prices (i) subsequently arrived while approving the Bill of Quantities (BOQ) /Billing breakup of lumpsum quantities/lot/Set and/or (ii) estimated by the bidder shall be for on account payment purpose only. In case additional quantities, over and above the quantities BOQ/billing breakup and /or estimated by the bidder, are required for successful completion of the scope of work as per Technical Specification, the Bidder shall execute additional quantities of these items for which no additional payment shall be made over and above the lumpsum bid price. In case quantities of these items supplied at site are in excess of that required for successful completion of scope of work,

such additional quantities shall be the property of the bidders and they shall be allowed to take back the same from the site for which no deduction from the lumpsum bid price shall be made. Further, in case actual requirement of quantities for successful completion of scope of work is less than the quantities identified in the approved BOQ /billing breakup and/or estimated by the bidder, the lumpsum bid price shall remain unchanged and no deduction shall be made from the lumpsum price due to such reduction of quantities.

22.2.2 It shall be the responsibility of the bidders to pay all statutory taxes, duties and levies to the concerned authorities for such surplus material, which would otherwise have been, lawfully payable. The bidders shall submit an indemnity bond to keep Employer harmless from any liability, before release of such material to the bidder by Employer.

22.2.3 Set/Lot/Lumpsum shall be governed as per the requirement of the corresponding item description read in conjunction with relevant provisions of Technical Specifications.

22.3 In the Schedules, bidders shall give the required details and a breakdown of their prices as follows:

(a) Plant and equipment manufactured or fabricated, shall be quoted on an EXW (ex-factory, ex-works, ex-warehouse or off-the-self, as applicable) basis, shall also be quoted in Schedule 1.

In respect of direct transaction between the Employer and the Contractor, EXW price shall be inclusive of all cost as well as duties and taxes (viz., customs duties & levies, duties, sales tax/VAT etc.) paid or payable on components, raw materials and any other items used for their consumption incorporated or to be incorporated in the Plant & Equipment.

Sales tax/VAT, excise duty, local tax and other levies for equipment/items under direct transaction including octroi/entry tax as applicable for destination site/state shall not be included in the EXW price but shall be indicated wherever applicable in respective column of Schedule 5.

Whenever EXW price is quoted exclusive of excise duty and/or VAT, then the due credit under the CENVAT (Central Value Added Tax)/VAT scheme as per the relevant Government policies wherever applicable shall be taken into account by the Bidder while quoting bid price.

In respect of bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Employer's site (sale-in-transit), EXW price shall be inclusive of all cost as well as duties and tax (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable. While quoting the EXW price, inclusive of excise duty and/or VAT, the due credit under the CENVAT (Central Value Added Tax)/VAT scheme as per the relevant Government policies wherever applicable shall be taken into account by the Bidder.

Further, Bidders offering (i) imported Equipments/items as 'Off the Shelf' or dispatched directly from the Indian Port of disembarkation and/or (ii) bought-out finished Equipments/items as 'Off the Self' items or dispatched directly from the Bidder's works, the price of such Equipments/items shall be inclusive of all cost as well as duties and tax (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable.

However, octroi/entry tax as applicable for destination site/state shall not be included in the EXW price but shall be indicated separately in respective column of Schedule 5.

Requisite Sales Tax Declaration forms for all the equipments/items to be supplied from within India shall be furnished by the Employer.

(b) Local transportation, insurance and other Services incidental to delivery of the Plant and Equipment including mandatory spares to be supplied shall be quoted separately in Schedule 2.

(c) Installation Charges shall be quoted separately (Schedule 3) and shall include rates and prices for all labour, Contractor's equipment, temporary works, materials, consumables and all matters and things of whatsoever nature, provision of operations and maintenance manuals, etc. wherever identified in the Bidding Documents as necessary for the proper execution of all installation services except those priced in other Schedules.

(d) The break-up of Training Charges shall be furnished separately in Schedule-4a for the training. Similarly, the break-up of Annual Maintenance Charges shall be furnished separately in Schedule-4b.

(e) The bidder shall include the Sales Tax/VAT on Works Contract, Turnover Tax or any other similar taxes under the Sales Tax/VAT Act for services to be performed, as applicable in their quoted bid price and Employer would not bear any liability whatsoever on this account. Employer (or the Employeron behalf of the Owner***)*** shall, however, deduct such taxes at source as per the rules and issue Tax Deducted at Source (TDS) Certificate to the bidder.

(f) The Bidder shall include Service Tax and surcharge/cess etc. on it as applicable in their quoted bid price and Employer would not bear any liability whatsoever on this account. Employer (or the Employer on behalf of the Owner) shall, however, deduct such tax at source as per the rules and issue necessary Certificate to the Contractor.

(g) The Bidder shall include insurance charges in its bid prices as per insurance requirement mentioned in Section – IV: General Conditions of Contract (**GCC**) of the Bidding Documents. Bidder shall further note that the Employer shall not be liable to make any payment/ reimbursement to the Contractor whatsoever for insurance of Contractor's Plant and Machinery.

22.3.1 Discount(s)/rebate(s) offered by the bidder shall be indicated as a percentage of price component(s). Bidder shall also indicate in his bid, the price component(s) on which the discount is to be applied.

22.4 The prices shall be in accordance with the following:

Prices quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation on any account. A bid submitted with the adjustable price quotation will be treated as non-responsive and rejected.

23. Bid Currencies

23.1 Prices shall be quoted in Indian Rupees Only.

24. Bid Security

24.1 The Bidder shall furnish, as part of its Second Stage bid, a bid security in the amount and currency as stipulated in the **BDS**. The bid security must be submitted in the form provided in the bidding document.

24.2 The bid security shall, at the bidder's option, be in the form of a crossed bank draft/pay orders/banks certified cheque in favour of Employer as stipulated in **BDS** from a reputed commercial bank or a bank guarantee from a scheduled commercial bank selected by the bidder and located in India. The format of the bank guarantee shall be in accordance with the form of bid security included in the Bidding Documents. Bid security shall remain valid for a period of thirty (30) days beyond the original bid validity period, and beyond any extension subsequently requested under ITB Sub-clause 25.2.

24.3 Any bid not accompanied by an acceptable bid security shall be rejected by the Employer and shall be returned unopened.

24.4 The bid securities of unsuccessful bidders will be returned as promptly as possible.

24.5 The successful Bidder shall be required to keep its bid security valid for a sufficient period till the performance security(ies) pursuant to ITB Clause 43 are furnished to the satisfaction of the Employer. The bid security of the successful Bidder will be returned when the Bidder has signed the Contract Agreement, pursuant to ITB Clause 42, and has furnished the required performance security, pursuant to ITB Clause 43.

24.6 The bid security may be forfeited

(a) if the Bidder withdraws its bid during the period of bid validity specified by the Bidder in the Bid Form; or

(b) If a Bidder does not accept the corrections to arithmetical errors identified during preliminary evaluation of his bid pursuant to ITB Clause 32.2; or

(c) If, as per the requirement of Qualification Requirements the Bidder is required to submit a Deed of Joint Undertaking and he fails to submit the same, duly attested by Notary Public of the place(s) of the respective executant(s) or registered with the Indian Embassy/High Commission in that Country, within ten days from the date of intimation of post – bid discussion; or

(d) in the case of a successful Bidder, if the Bidder fails within the specified time limit

(i) to sign the Contract Agreement, in accordance with ITB Clause 42, or

(ii) to furnish the required performance security(ies), in accordance with ITB Clause 43 and/or to keep the bid security valid as per the requirement of ITB Sub Clause 24.5.

24.7 No interest shall be payable by the Employer on the above Bid Security.

25. Period of Validity of Bid

25.1 Second Stage Bids shall remain valid for the period of six months after the date of opening of bids prescribed by the Employer, pursuant to ITB Sub-Clause 28.1. A bid valid for a shorter period shall be rejected by the Employer as being nonresponsive.

25.2 In exceptional circumstance, the Employer may solicit the Bidder's consent to an extension of the bid validity period. The request and responses thereto shall be made in writing or by cable. If a Bidder accepts to prolong the period of validity, the bid security shall also be suitably extended. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request will not be required or permitted to modify its bid.

26. Format and Signing of Bid

26.1 The Bidder shall prepare an original and two number of copies/sets of the bid, clearly marking each one as: "**Second Stage Bid—Original**", "**Second Stage Bid—Copy No. 1**", "**Second Stage Bid—Copy No. 2**", as appropriate. In the event of any discrepancy between the original and any copy, the original shall govern.

26.2 The original and both the copies of the bid, each consisting of the documents listed in ITB Sub-Clause 20.1, shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the contract. The latter authorization shall be indicated by written power of attorney accompanying the bid and submitted as Attachment 2 to the Bid under ITB Sub-Clause 20.1. All pages of the bid, except for unamended printed literature, shall be initialed by the person or persons signing the bid.

26.3 The bid shall contain no alterations, omissions or additions, unless such corrections are initialed by the person or persons signing the bid.

26.4 The Bidder shall furnish information as described in the last paragraph of the Form of Bid on commissions or gratuities, if any, paid or to be paid to agents relating to this bid, and to contract execution if the Bidder is awarded the contract.

E2. Second Stage Bids: Submission

27. Sealing and Marking of Second Stage Bids

27.1 The Bidder shall seal the original and each copy of the second stage bid in separate envelopes, duly marking the envelopes as "Second Stage Bid—Original" and "Second Stage Bid—Copy No. [*number*]". The envelopes shall be sealed in an outer envelope.

27.2 The inner and outer envelopes shall

(a) be addressed to the Employer at the address given in the **BDS**, and

(b) bear the contract name indicated in the **BDS**, title and number indicated in Invitation for Bids for Second Stage Bids, and the statement "SECOND STAGE BID. DO NOT OPEN BEFORE [date]", to be completed with the time and date specified in the invitation, pursuant to ITB Sub-Clause 31.1.

27.3 The inner envelopes shall also indicate the name and address of the Bidder to enable the bid to be returned unopened in case it is declared "late."

27.4 If the outer envelope is not sealed and marked as required by ITB Sub-Clauses 27.2, the Employer will assume no responsibility for the bid's misplacement or premature opening. If the outer envelope discloses the Bidder's identity, the Employer will not guarantee the anonymity of the bid submission, but this disclosure will not constitute grounds for bid rejection.

28. Deadline for Submission of Bids

28.1 Second Stage bids must be received by the Employer at the address specified under ITB Sub-Clause 27.2 and no later than the time and date stated in the Invitation to submit Second Stage Bid. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the bids will be received upto the appointed time on the next working day. Bids once received by the Employer shall not be returned except otherwise provided in the Bidding Documents.

28.2 The Employer may, at its discretion, extend this deadline for submission of bids by amending the Bidding Documents in accordance with ITB Sub-Clause 7.3 for the reasons specified therein at any time prior to opening of bids by the Employer pursuant to ITB Clause 31, in which case all rights and obligations of Employer and bidders will thereafter be subject to the deadline as extended.

29. Late Bids

29.1 Any bid received by the Employer after the bid submission deadline prescribed by the Employer, pursuant to ITB Clause 28, will be rejected and returned unopened to the Bidder.

30. Modification and Withdrawal of Bids

30.1 The Bidder may modify or withdraw its Second Stage bid after submission, provided that modification or written notice of withdrawal is received by the Employer prior to the deadline prescribed for bid submission.

30.2 The Bidder's modifications shall be prepared, sealed, marked and dispatched as follows:

(a) The Bidders shall provide an original and two number of copies of any modifications to its bid, clearly identified as such, in two inner envelopes duly marked "Second Stage Bid Modifications—Original" and "Second Stage Bid Modifications—Copies." The inner envelopes shall be sealed in an outer envelope, which shall be duly marked "Second Stage Bid Modifications."

(b) Other provisions concerning the marking and dispatch of bid modifications shall be in accordance with ITB Sub-Clauses 27.2, 27.3 and 27.4.

30.3 A Bidder wishing to withdraw its bid shall notify the Employer in writing prior to the deadline prescribed for bid submission. The notice of withdrawal shall

(a) be addressed to the Employer at the address named in the **BDS**, and

(b) bear the contract name, the IFB number, and the words "Second Stage Bid Withdrawal Notice." Bid withdrawal notices received after the bid submission deadline will be ignored, and the submitted bid will be deemed to be a validly submitted bid.

30.4 No Second Stage bid may be withdrawn in the interval between the bid submission deadline and the expiration of the bid validity period specified in ITB Clause 25. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its bid security, pursuant to ITB Sub-Clause 24.6.

E3. Second Stage Bids: Opening and Evaluation

31. Opening of Second Stage Bids by Employer

31.1 The Employer will open the Second Stage bids in public, including withdrawals and modifications made pursuant to ITB Clause 30, in the presence of bidders' designated representatives who choose to attend, at the time, date, and location stipulated in the **BDS**. The bidders' representatives who are present shall sign a register evidencing their attendance. In the event of the specified date for the submission of bids being declared a holiday for the Employer, the bids will be received upto the appointed time on the next working day.

31.2 Envelopes marked "Withdrawal" shall be opened first and the name of the Bidder shall be read out. Bids for which an acceptable notice of withdrawal has been submitted pursuant to ITB Clause 30 shall be returned unopened.

31.3 For all other Bids, the bidders' names, the Bid Prices, including deviation, any discounts, the presence of bid security, the financing proposal, losses figures, and any such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. Subsequently, all envelopes marked "Modification" shall be opened and the submissions therein read out in appropriate detail. No bid shall be rejected at bid opening except for late bids pursuant to ITB Clause 29 and bids not accompanied with bid security or the bid security is found to be prima facie unacceptable. Such bids shall be returned to the Bidder unopened. However, opening of bid accompanied with the bid security shall not be construed to imply its acceptability which shall be examined in detail pursuant to ITB 32.

31.4 The Employer shall prepare minutes of the bid opening in the form of Bid Opening Statement, including the information disclosed to those present in accordance with ITB Sub-Clause 31.3. The prices and details as may be read out during the bid opening and recorded in the Bid Opening Statement would not be construed to determine the relative ranking amongst the Bidders, or the successful Bidder, and would not confer any right or claim whatsoever on any Bidder. The successful Bidder (also referred to as the L1 Bidder) shall be determined as per the provisions of this Section – II and considered for award of contract as provided in ITB Clause 39.

31.5 Bids not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances and shall be returned to the Bidder unopened.

32. Preliminary Examination of Second Stage Bids

32.1 The Employer will examine the Second Stage bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order. The Employer may, at its discretion, ask the Bidder for a clarification of its bid. The request for clarification and the response shall be in writing, and no change in the price or substance of the bid shall be sought, offered or permitted.

32.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity, or between subtotals and the total price, the unit or subtotal price shall prevail, and the total price shall be corrected. However, in case of items quoted without indicating any quantity or the items for which the quantities are to be estimated by the Bidder, the total price quoted against such items shall prevail. If there is a discrepancy between words and figures, the amount in words will prevail. The subtotal, total price or the total bid price, irrespective of the discrepancy between the amount indicated in words or figures shall be rectified in line with the procedure explained above. If the Bidder does not accept the correction of errors, its bid will be rejected and the amount of Bid Security forfeited.

The prices of all such item(s) against which the Bidder has not quoted rates/amount (viz., items left blank or against which '-' is indicated) in the Price Schedules will be deemed to have been included in other item(s).

If the discount(s)/rebate(s) offered by the Bidder is a percentage discount and the price component(s) on which the said discount is not indicated in the bid, the same shall be considered on the total bid price [i.e. proportionately on each price component], in the event of award. However, if lump-sum discount is offered, the same shall be considered in full on the Ex-works price component (by proportionately reducing Ex-works price of individual items), in case of award. Further, Conditional discounts/rebates, if any, offered by the bidder shall not be taken into consideration for evaluation. It shall, however, be considered in case of award.

In respect of taxes, duties and other levies indicated by the Bidder in the Bid, which are reimbursable in line with the provisions of the Bidding Documents, the applicable rate and amount thereof shall be ascertained by the Employer based on which, if required, necessary rectification and arithmetical correction shall be carried out by the Employer for the purpose of evaluation. The rate and amount so ascertained by the Employer shall prevail.

The Bidder should ensure that the prices furnished in various price schedules are consistent with each other. In case of any inconsistency in the prices furnished in the specified price schedules to be identified in Bid Form for this purpose, the Employer shall be entitled to consider the highest price for the purpose of evaluation and use the lowest of the prices in these schedules for the purpose of award of the Contract.

32.3 The Employer may waive any minor informality, nonconformity or irregularity in a bid that does not constitute a material deviationand that does not prejudice or affect the relative ranking of any Bidder as a result of the technical and commercial evaluation, pursuant to ITB Clauses 34 and 35.

32.4 Prior to the detailed evaluation, the Employer will determine whether each bid is of acceptable quality, is complete, is substantially responsive to the Bidding Documents and has properly incorporated all the modifications listed in the “Changes Required Pursuant to First Stage Evaluation” or any other changes required by the Employer. For purposes of this determination, a substantially responsive bid is one that conforms to all the terms, conditions and specifications of the Bidding Documents and the “Changes Required Pursuant to First Stage Evaluation” or any other changes required by the Employer without material deviations, objections, conditionalities or reservations. A material deviation, objection, conditionality or reservation is one (i) that affects in any substantial way the scope, quality or performance of the contract; (ii) that limits in any substantial way, inconsistent with the Bidding Documents, the Employer’s rights or the successful Bidder’s obligations under the contract; or (iii) whose rectification would unfairly affect the competitive position of other bidders who are presenting substantially responsive bids.

32.4.1 Regarding deviations, conditionality or reservations introduced in the bid, which will be reviewed to conduct a determination of substantial responsiveness of the Bidder’s bid as stated in ITB Clause 32.4, the order of precedence of these documents to address contradictions, if any, in the contents of the bid, shall be as follows:

I. Covering Letter

II. Bid Form

III. Price Schedule

IV. Technical Data Sheet

V. Any other part of the bid

Contents of the document at Sr. No. I above will have overriding precedence over other documents (Sr. No. II to V above).Similarly, contents of document at Sr. No. II above will have overriding precedence over other documents (Sr. No. III to V above), and so on.

32.5 If a Second Stage bid is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by the Bidder by correction of the nonconformity. The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.

33. Conversion to Single Currency

33.1 This shall not be applicable as firms are required to quote the prices in Indian Rupees only.

34. Technical Evaluation of Second Stage Bid

34.1 The Employer will carry out a detailed evaluation of the Second Stage bids to determine whether the technical aspects concerning the modifications to the technically acceptable base" or any other changes required by the Employer, pursuant to ITB Sub-Clause 19.1, have been properly addressed and are substantially responsive to the requirements set forth in the Bidding Documents.

35. Commercial Evaluation of Second Stage Bid

35.1 The comparison shall be on the total price in Price Schedule No. 6 Grand Summary (Total of Schedule Nos. 1 to 5).

The comparison shall also include the applicable taxes, duties and other levies, which are reimbursable in line with the provisions of the Bidding Documents.

The Employer's comparison will also include the costs resulting from application of the evaluation procedures described in ITB Sub-Clause 35.2 & 35.3.

35.2 The Employer's evaluation of a bid will take into account, in addition to the bid prices indicated in Price Schedule Nos. 1 through 5, the following costs and factors that will be added to each Bidder's bid price in the evaluation using pricing information available to the Employer, in the manner and to the extent indicated in ITB Sub-Clause 35.3 and in the Technical Specifications:

(a) compliance with the time schedule as needed in a milestone schedule provided in the bid;

(b) the functional guarantees of the facilities offered;

(c) The performance of the equipment offered;

Bidder shall conform to the guaranteed performance or efficiency of the Equipments in response to the Technical Specifications. Equipments offered shall have minimum performance specified in Technical Specification to be considered responsive. Bids offering Equipments with a performance less than the specified may be rejected.

(d) the extra cost of work, services, facilities, etc., required to be provided by the Employer or third parties;

(e) any other relevant factors listed in BDS.

35.3 Pursuant to ITB Sub-Clause 35.2, the following evaluation methods will be followed:

(a) Contractual and commercial deviations

The evaluation shall be based on the evaluated cost of fulfilling the contract in compliance with all commercial, contractual and technical obligations under this bidding document.

(b) Time schedule (program of performance)

The plant and equipment covered by this bidding shall have the 'Taking Over' by the Employer after successful Completion within the period specified in **BDS**. Bidders are required to base their prices on the Completion date(s) given above.

No credit will be given to earlier completion. Bids offering completion beyond the specified period will be rejected.

(c) Functional Guarantees of the facilities

(i) Bidders shall state the functional guarantees (e.g., performance, efficiency, consumption) of the proposed facilities in response to the Technical Specifications. Plant and equipment offered shall have a minimum (or a maximum, as the case may be) level of functional guarantees specified in the Technical Specifications to be considered responsive. Bids offering plant and equipment with functional guarantees less (or more) than the minimum (or maximum) specified shall be rejected.

(ii) For the purposes of evaluation, the adjustment specified in the Technical Specifications will be added to the bid price for each drop (or excess) in the responsive functional guarantees offered by the Bidder, below (or above) either a norm of one hundred (100) or the value committed in the responsive bid with the most performing functional guarantees, as specified in the Technical Specifications.

(d) Performance Guarantees of the Equipments

(i) Bidder shall state the guaranteed performance or efficiency of the Equipments, named in the BDS, in response to the Technical Specifications. Equipment offered shall have a minimum (or a maximum, as the case may be) level of guarantees specified in the Technical Specifications to be considered responsive. Bids offering plant and equipment with guarantees less (or more) than the minimum (or maximum) specified shall be rejected.

(ii) For the purposes of evaluation, the adjustment specified in the **BDS** will be added to the bid price for each drop (or excess) in the guarantees offered by the Bidder.

(e) Work, services, facilities, etc., to be provided by the Employer

Where bids include the undertaking of work or the provision of services or facilities by the Employer in excess of the provisions allowed for in the Bidding Documents, the Employer shall assess the costs of such additional work,

services and/or facilities during the duration of the contract. Such costs shall be added to the bid price for evaluation.

35.4 Any adjustments in price that result from the above procedures shall be added, for purposes of comparative evaluation only, to arrive at an "Evaluated Bid Price." Bid prices quoted by bidders and rectified as per ITB Sub Clause 32.2 shall remain unaltered.

36. Purchase/Domestic Preference

36.1 No Purchase Preference as will be admissible in evaluation and comparison of bids.

37. Contacting the Employer

37.1 From the time of bid opening to the time of contract award, if any Bidder wishes to contact the Employer on any matter related to its bid, they should do so in writing.

37.2 Any effort by a Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decisions may result in rejection of the Bidder's bid. The Employer shall be the sole judge in this regard.

F. Award of Contract

38. Changes in Qualification Status

38.1 Prior to proceeding with the award of contract, the Employer will determine to its satisfaction that no circumstances, in particular the Bidder's contract work in hand, future commitments and current litigation, have arisen or intervened during the period between the submission of the First and Second Stage bids that would change the Employer's opinion as to whether the Bidder determined as having submitted the lowest evaluated and responsive Second Stage bid is still qualified to satisfactorily perform the contract.

38.2 An affirmative determination will be a prerequisite for award of the contract to the Bidder. A negative determination will result in rejection of the Bidder's bid, in which event the Employer will proceed to the next lowest evaluated bid to make a similar determination of that Bidder's capabilities to perform satisfactorily.

38.3 The capabilities of the vendors and subcontractors proposed in Attachment 5 to be used by the lowest evaluated Bidder will also be evaluated for acceptability. Their participation should be confirmed with a letter of intent between the parties, as needed. Should a vendor or subcontractor be determined to be unacceptable, the Bid will not be rejected,

but the Bidder will be required to substitute an acceptable vendor or subcontractor without any change to the bid price.

39. Award Criteria

39.1 Subject to ITB Clause 40, the Employer will award the contract to the successful Bidder (also referred to as the L1 Bidder) whose Second Stage bid has been determined to be substantially responsive and to be the lowest evaluated bid, further provided that the Bidder is determined to be qualified, as per the Qualification Requirement specified in Annexure-A(BDS) to perform the contract satisfactorily. This shall, however, be subject to assessment that may be carried out, if required, by the Employer as per the provisions of Annexure – A(BDS). The Employer shall be the sole judge in this regard.

The Employer reserves the right to waive minor deviations if they do not materially affect the capability of the Bidder to perform the contract.

39.2 The Employer reserves the right to vary the quantity of any of the spares and/or delete any items of spares altogether at the time of Award of Contract. However, evaluation will be carried out as per the quantity of spares stipulated in second stage bids.

39.3 The mode of contracting with the successful bidder will be as per stipulation outlined in Clause GCC 2.1 and briefly indicated below:

39.4 The award shall be made as follows:

(i) First Contract: For Ex-Works supply of all equipments and materials (whether in India or abroad) including mandatory spares and Type Test to be conducted (whether in India or abroad).

(ii) Second Contract: For providing all services i.e. port handling and custom clearance of imported goods and loading, inland transportation for delivery at site, insurance, unloading, storage, handling at site, installation, Testing and Commissioning including performance testing in respect of all the equipments supplied under the "First Contract", Training to be imparted (whether in India or abroad), Maintenance of the equipment and any other services specified in the Contract Documents.

Both contracts will contain a cross fall breach clause specifying that breach of one will constitute breach of the other.

40. Employer's Right to Accept Any Bid and to rejectany or All Bids

40.1 The Employer reserves the right to accept or reject any First or Second Stage bid, and to annul the bidding process and reject all bids at any time prior to award of contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Employer's action.

41. Notification of Award

41.1 Prior to the expiration of the period of Second Stage bid validity, the Employer will notify the successful Bidder in writing, that its bid has been accepted. The notification of award will constitute the formation of the contract.

41.2 The Employer shall publish the results on its website, identifying the bid and Specification numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each Bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded.

41.3 Upon the successful Bidder's furnishing of the performance security pursuant to ITB Clause 43, the Employer will promptly discharge the bid securities, pursuant to ITB Sub-Clause 24.4 & 24.5.

42. Signing the Contract Agreement

42.1 At the same time as the Employer notifies the successful Bidder that its Second Stage bid has been accepted, the Employer in consultation with the Bidder may prepare the Contract Agreement incorporating all agreements between the parties.

43. Performance Security

43.1 Within thirty (30) days after receipt of the notification of award, the successful Bidder shall furnish the performance security for 10% (Ten percent) of the contract price plus additional performance securities, if any, in line with the requirement of Qualification Requirements, in the amount given in the **BDS** and in the form provided in Section VII, Sample Forms and Procedures, of the Bidding Documents.

43.2 Failure of the successful Bidder to comply with the requirements of ITB Clause 42 or Clause 43 shall constitute sufficient grounds for the annulment of the award and

forfeiture of the bid security, in which event the Employer may make the award to the next lowest evaluated Bidder or call for fresh bids.

44. Fraud and Corruption

44.1 It is the Employer's policy that requires the Bidders, suppliers and contractors and their subcontractors under the contracts to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Employer:

(a) defines, for the purpose of this provision, the terms set forth below as follows:

(i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "Collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

(iv) "coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Employer's investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation;

or

(bb) acts intended to materially impede the exercise of the Employer's inspection and audit rights.

(b) will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

(d) will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, a contract; and

(e) will have the right to require that the provision be included in Bidding Documents and in contracts, requiring Bidders, suppliers, and contractors and their sub-contractors to permit the Employer to inspect their accounts and records and other documents relating to bid submission and contract performance and to have them audited by auditors appointed by the Employer.

Section-3

3 Bid Data Sheet

Sl. No.	ITB Clause Ref. No.	Bid Data Details
1.	ITB 1.1	The Employer is: WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED IT&C Cell, 3rd Floor , D Block, Vidyut Bhavan , Block DJ, Sector-II , Salt Lake , Kolkata -700091 Email :itcell@wbsedcl.in Contact no. :- 033-23584716/23197263
2.	ITB 12.2(a), ITB 12.2(b), ITB 13.1, and ITB 14.1	Website Address for submission of First Stage Bids and its modification ,if any; https://wbtenders.gov.in Deadline : < Date and Time for Submission of First Stage Bid > 08.08.2014 at 02:00 PM < Address for First Stage Bid Opening > IT&C Cell, 3rd Floor , D Block, Vidyut Bhavan , Block DJ, Sector-II , Salt Lake , Kolkata -700091 < Time and date for First Stage Bid Opening > 08..08.2014 at 03:00 PM (a) Bid Title: First Stage Bid for Smart Grid Elements Implementation (b) Do not open before < date and time > 08..08.2014 at 03:00 PM
3.	ITB 24.1	Amount of Bid Security: **<Rs.17,58,000.00(Rs. Seventeen lakhs Fifty Eight Eight Thousand)>**
4.	ITB 24.2	The Bid Security shall be in favour of '**Employer**'
5.	ITB 27.2(a), ITB 27.2(b), ITB 28.1, ITB 30.3 (a) and ITB 31.1	Address for submission of Second Stage Bids and its modification and withdrawal, if any; Address in Person or by Post: WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED IT&C Cell, 3rd Floor , D Block, Vidyut Bhavan ,

Sl. No.	ITB Clause Ref. No.	Bid Data Details
		Block DJ, Sector-II , Salt Lake , Kolkata -700091 Deadline: As per ITB Sub-Clause 28.1, the deadline shall be specified in the Employer's letter while inviting Second Stage Bids from the short-listed bidders. < Address for Second Stage Bid Opening > Same as first stage bid opening. < Time and date for Second Stage Bid Opening > Date & Time: To be intimated by the Employer to the short-listed bidders at the time of inviting Second Stage Bids from them. (a) Bid Title: Second Stage Bid for Smart Grid Elements implementation. (b) Do not open before < time and date > :Will be intimated later
6.	ITB 35.2 (c)	This shall be applied as per the provision of Technical Specification, Volume-II of the Bidding Documents.
7.	ITB 35.3 (b)	The Time for Completion for successful Completion of Smart Grid Elements implementation shall be 18 (Eighteen) months from the date of Notification of Award.
8.	ITB 35.3 (c)	This shall be applied as per the provision of Technical Specification, Volume-II of the Bidding Documents.
9.	ITB 35.3 (d)	For the purpose of evaluation, no adjustment to the bid price towards performance guarantees of the equipments is applicable. However, the provision of Technical Specification, Volume-II of the Bidding Documents and Clause ITB 35.2 (d) shall prevail.
0.	ITB 43.1	In addition to the Performance Security of 10% of the Contract Price, the successful bidder is required to furnish additional performance security (ies), if applicable, as per Clause no. 4 of Joint Deed of Undertaking mentioned at Sl. No. 19 of Section – VI: Sample Forms and Procedures.

Payment Schedule :-Milestone based payment for project will be regulated as under :-

Sl. no.	Milestone achieved	Payment to be disbursed
1.	Software interoperability Matrix, Data Exchange information, Module List and Data Blue print (Metadata) details	5%
2.	Approval of DRS of Hardware, Configuration Diagram and Test Procedures	10%
3.	On receipt of all the necessary field equipments like Smart Energy meters, DCUs, Repeaters & hand held units etc. at the Field location.	20%
4.	Against Factory Acceptance test at vendors work &On receipt of all the necessary hardware & software equipments like servers, application software, network hardware, workstations & printers etc. at the Control room.	20%
5.	On successful installation, testing, commissioning and auditing of all systems(Site Acceptance Test)	20%
6	On successful operation acceptance	10%
7	After One year warranty period(from date of Operation Acceptance)	10%
8.	On providing necessary trainings as mentioned in specifications.	5%

QUALIFICATION OF THE BIDDERS Appendix-A (BDS)

Qualification Criteria:

Qualification of Bidder will be based on meeting the minimum pass/fail criteria specified below regarding the Bidder's Technical Experience and Financial Position as demonstrated by the Bidder's responses in the corresponding Bid Schedules. Technical experience and financial resources of any proposed subcontractor shall not be taken into account in determining the Bidder's compliance with the qualifying criteria. The bid can be submitted by an individual firm or a Joint Venture of two or more firms (specific requirements for Joint Ventures are given under Para 3.0 below).

The Employer may assess the capacity and capability of the bidder, to successfully execute the scope of work covered under the package within stipulated completion period. This assessment shall inter-alia include (i) document verification; (ii) bidders work/manufacturing facilities visit; (iii) manufacturing capacity, details of works executed , works in hand, anticipated in future & the balance capacity available for present scope of works; (iv) details of plant and machinery, manufacturing and testing facilities, manpower and financial resources; (v) details of quality systems in place; (vi) past experience and performance; (vii) customer feedback; (viii) banker's feedback etc.

1.0 TECHNICAL EXPERIENCE

Bid shall be submitted by an individual firm or consortium of firms, who meet the following Technical requirements:

a) The bidder should have installed, tested and commissioned at least two (2) no. of projects involving on Advanced Metering Infrastructure (AMI) or Automated Meter Reading (AMR) or Supervisory Control And Data Acquisition (SCADA), wherein the bidder has executed installation of hardware and application software in the field of power transmission or distribution in last five years as on originally scheduled date of submission of bids.

i AMI or AMR project considered above should have at least 1000 nos. consumers.
ii) SCADA project considered above should have at least 5000 nos. configured Input / Output points.

2.0 Financial Requirements

For the purpose of this particular bid, bidders shall meet the following minimum criteria:

a) Net Worth for last three (3) financial years should be positive

b) Minimum Average Annual Turnover* (MAAT) of the bidder for last three financial years ending on 31.03.2014 should be Rs 15 Cr.

* Note- Annual total income as incorporated in the profit & loss account except nonrecurring income e.g. sale of fixed assets

In case bidder is a holding company, the Financial Position criteria referred to in clause 2.0 above shall be that of holding company only (i.e. excluding its subsidiary / group companies). In case bidder is a subsidiary of a holding company, the Financial Position criteria referred to in clause 2.0 above shall be that of subsidiary company only (i.e. excluding its holding company).

3.0 Joint Venture Bids

3.1 In case a bid is submitted by a Joint Venture (JV) of two or more firms as partners,the JV shall meet collectively the complete requirements mentioned at clause no. 1.0 (a)and 2.0 (b) & (c) above. Further, the partners of Joint Venture shall meet the following requirements:

(a) All the partners of the JV shall meet individually the Financial Position criteria given at 2.0 (a) above.

(b) The lead partner shall meet not less than 40% of the Financial Position minimum criteria given at clause no. 2.0 (b) above.

(c) Each of the other partner(s) individually shall meet not less than 25% of the minimum Financial Position criteria given at clause no. 2.0 (b) above.

The figure of average annual turnover and liquid assets/credit facilities for each of the partners of the JV shall be added together to determine the JV's compliance with the minimum qualifying criteria set out in clause no. 2.0 (b) above.

However, for a JV to be qualified, the partner(s) of JV must also meet the following criteria:

I. The lead partner of the JV shall meet individually the Technical Requirement criteria given at clause no. 1.0 (a) above.

II. Either of the partners(s) of JV must be a manufacturer of Smart energy meters or Electronic Energy meter. The bidder must have supplied at least 50 no. of Smart Meter or 50000 Electronic Energy Meter in last 5 years as on or before originally scheduled date

of submission of application.

3.2 In case of Joint Venture, the following conditions shall also apply:

i) the bid, and in case of successful bid, the Form of Agreement shall be signed so as to be legally binding on all partners.

ii) one of the partners shall be nominated as Lead Partner, and the Lead Partner shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the Joint Venture, and the entire execution of the Contract shall be done with the Lead Partner and payment under the contract shall be received by the Lead Partner on behalf of the Joint Venture as per power conferred to him in the Power of Attorney. The authorization shall be evidenced by submitting a Power of Attorney signed by legally authorized signatory of all the partners .The payment under the Contract can also be received by other partner(s) based on authorization of Lead Partner.

iii) All partners of the Joint Venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms, and a statement to this effect shall be included in the authorization mentioned under (ii) above as well as in the Bid Form and in the Contract Form (in case of a successful bid).

iv) Agreement entered into by the Joint Venture partners shall be submitted with the bid.

4.0 The bidder shall furnish documentary evidence in support of the qualifying requirement stipulated as above.

Section: 4

4 General Conditions of Contract (GCC)

General Conditions of Supply

A. Definitions and Interpretation

1. Definitions

1.1 The following words and expressions shall have the meanings hereby assigned to them:

(a) "Arbitrator" means the person or persons appointed by agreement between the Employer and the Contractor to make a decision on or to settle any dispute or difference between the Employer and the Contractor referred to him or her by the parties pursuant to GCC Sub-Clause 39.1 (Arbitration) hereof.

(b) "Associate" means a party who has been conjoined by the Contractor to independently execute a pre-selected part of facilities of the contract and grant him the associated contractual rights and obligations, without diluting the overall responsibility of the contractor in respect of the Facilities under the contract.

(c) "Collaborator" or "Parent Company" means the firms/corporations who has provided technological support to the manufacturer for establishing production line for the specific Equipment.

(d) "Commissioning" means operation of the Facilities or any part thereof, if any, as per GCC Sub-Clause 1.1(e) by the Contractor as specified in the Technical Specifications, which operation is to be carried out by the Contractor as provided in GCC Sub-Clause 20.1.3 (Commissioning), for the purpose of Trial – Operation (GCC Sub-Clause 20.1.4).

(e) "Completion" means that the Facilities (or a specific part thereof where specific parts are specified in the **SCC**) have been completed operationally and structurally and put in a tight and clean condition and that all works in respect of pre-commissioning of the Facilities (or a specific part thereof where specific parts are specified in the **SCC**) has been completed (wherever required, as per Technical Specifications) and Commissioning followed by Trial – Operation has been completed, as provided in GCC Sub-Clause 20.1 (Completion of Facilities) hereof.

(f) "Contract" means the Contract Agreement entered into between the Employer and the Contractor together with the Contract Documents referred to therein.

(g) "Contract Documents" means the documents listed in Clause 1.1 of Article 1 (Contract Documents) of the Form of Contract Agreement (including any amendments thereto).

(h) "Contract Price" means the sum specified in Clause 2.1 of Article 2 (Contract Price) of the Contract Agreement, subject to such additions or deductions therefrom, as may be made pursuant to the Contract. For the purpose of Liquidated Damages and Contract Performance Guarantee, the "Contract Price" means the sum specified in Clause 2.1 of Article 2 (Contract Price) of the Contract Agreement.

(i) "Contractor" means the firms whose bid to perform the Contract has been accepted by the Employer and is named in the Contract Agreement, and includes the legal successors or permitted assigns of the Contractor.

(j) "Contractor's Equipment" means all plant, facilities, equipment, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant and Equipment, or other things intended to form or forming part of the Facilities.

(k) "Contractor's Representative" means any person nominated by the Contractor and approved by the Employer in the manner provided in GCC Sub-Clause 13.2 (Contractor's Representative and Construction Manager) hereof to perform the duties delegated by the Contractor.

(l) "Day" means calendar day of the Gregorian Calendar.

(m) "Defect Liability Period" means the period of validity of the warranties given by the Contractor commencing at Completion of the Facilities or a part thereof, if any, as per GCC Sub-Clause 1.1(e), during which the Contractor is responsible for defects with respect to the Facilities (or the relevant part thereof) as provided in GCC Clause 22 (Defect Liability) hereof.

(n) "Effective Date" means the date of Notification of Award from which the Time for Completion shall be determined.

(o) "Employer" means the firm/corporation/ government entity, named in the **SCC**, who is responsible for getting the Facilities implemented. The Employer may be Owner himself or an agency appointed by the Owner and shall include the legal successors or permitted assigns of the Employer.

(p) "Facilities" means the Plant and Equipment to be supplied and installed, as well as all the Installation Services to be carried out by the Contractor under the Contract.

(q) "GCC" means the General Conditions of Contract hereof.

(r) "Guarantee Test(s)" means the test(s) specified in the Technical Specifications to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Technical Specifications in accordance with the provisions of GCC Sub-Clause 20.2.1 (Guarantee Test) hereof during/after successful Commissioning followed by Trial - Operation.

(s) "Installation Services" means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance, inspection, expediting, site preparation works (including the provision and use of Contractor's Equipment and the supply of all construction materials required), installation, testing, pre commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training, etc.

(t) "Month" means calendar month of the Gregorian Calendar.

(u) "Notification of Award" means the official notice issued by the Employer notifying the Contractor that his bid has been accepted.

(v) "Operational Acceptance" means the acceptance by the Employer of the Facilities (or any part of the Facilities where the Contract provides for acceptance of the Facilities in parts), which certifies the Contractor's fulfillment of the Contract in respect of Functional Guarantees of the Facilities (or the relevant part thereof) in accordance with the provisions of GCC Sub-Clause 20.2.2 (Operational Acceptance) hereof after successful Commissioning followed by Trial - Operation.

(w) "Owner" means the firm/corporation/government entity, named in the SCC, who has decided to set up the Facilities and shall includes the legal successors or permitted assigns of the Owner.

(x) "Plant and Equipment" means permanent plant, equipment, machinery, apparatus, articles and things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts to be supplied by the Contractor under GCC Sub-Clause 3.3 hereof), but does not include Contractor's Equipment.

(y) "Precommissioning" means the testing, checking and other requirements specified in the Technical Specifications that are to be carried out by the Contractor in preparation for Commissioning as provided in GCC Sub-Clause 20.1.2 (Pre-Commissioning)hereof.

(z) "Project Manager" means the person appointed by the Employer in the manner provided in GCC Sub-Clause 13.1 hereof to perform the duties delegated by the Employer.

(aa) "SCC" means the Special Conditions of Contract.

(bb) "Site" means the land and other places upon which the Facilities are to be installed, and such other land or places as may be specified in the Contract as forming part of the Site.

(cc) "Subcontractor"/"vendor"/"sub-vendor" means firms/ corporations/government entities to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant and Equipment, is sub-contracted directly or indirectly by the Contractor with the consent of the Employer in writing, and includes its legal successors or permitted assigns.

(dd) "Taking Over" means the Employer's written acceptance of the Facilities under the Contract, after successful Trial – Operation for the specified period in accordance with the Contract, as provided in GCC Sub-Clause 20.1.5.

(ee) "Time for Completion" means the time within which Completion of the Facilities is to be attained in accordance with the specifications, as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed in the **SCC**) and "Taking Over" by the Employer is to be attained.

2. Interpretation

2.1 Contract

The Contracts to be entered into with the successful Bidder shall be as defined in **SCC**.

2.2 Contract Documents

All documents forming part of the Contract (and all parts thereof) are intended to be correlative, complementary and mutually explanatory, subject to Article 1.2 (Order of Precedence) of the Contract Agreement. The Contract shall be read as a whole.

2.3 Language

The ruling language of the Contract and the language for communications shall be English.

2.4 Singular and Plural

The singular shall include the plural and the plural the singular, except where the context otherwise requires.

2.5 Headings

The headings and marginal notes in the General Conditions of Contract are included for ease of reference, and shall neither constitute a part of the Contract nor affect its interpretation.

2.6 Entire Agreement

Subject to GCC Sub-Clause 12.4 hereof, the Contract constitutes the entire agreement between the Employer and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract.

2.7 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party hereto.

2.8 Independent Contractor

The Contractor shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture or other joint relationship between the parties hereto.

Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Subcontractors engaged by the Contractor in connection with the performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Employer, and nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Subcontractors and the Employer.

2.9 Joint Venture

If the Contractor is a joint venture of two or more firms, all such firms shall be jointly and severally bound to the Employer for the fulfillment of the provisions of the Contract and shall designate one of such firms to act as a leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior written consent of the Employer.

2.10 Non-Waiver

2.10.1 Subject to GCC Sub-Clause 2.10.2 below, no relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

2.10.2 Any waiver of a party's rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

2.11 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

2.12 Country of Origin

"Origin" means the place where the materials, equipment and other supplies for the Facilities are mined, grown, produced or manufactured, and from which the services are provided. Plant and equipment are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

2.13 Notices

2.13.1 Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing, and shall be sent by personal delivery, special courier, telegraph, facsimile or Electronic Data Interchange (EDI) to the address of the relevant party set out in the Contract Agreement, with the following provisions:

(a) Any notice sent by telegraph, facsimile or EDI shall be confirmed within two (2) days after dispatch by notice sent by special courier, except as otherwise specified in the Contract.

(b) Any notice sent by special courier shall be deemed (in the absence of evidence of earlier receipt) to have been delivered ten (10) days after dispatch. In proving the fact of dispatch, it shall be sufficient to show that the envelope containing such notice was properly addressed, stamped and conveyed to the postal authorities or courier service for transmission by special courier. Provided further that whenever the postal authorities or courier service provide a proof of delivery, the same shall also be applicable for presenting the fact of dispatch.

(c) Any notice delivered personally or sent by telegraph, facsimile or EDI shall be deemed to have been delivered on date of its dispatch.

(d) Either party may change its postal, facsimile or EDI address or addressee for receipt of such notices by ten (10) days' notice to the other party in writing.

2.13.2 Notices shall be deemed to include any approvals, consents, instructions, orders and certificates to be given under the Contract.

2.14 Governing Law & its Jurisdiction

The Contract shall be governed by and interpreted in accordance with laws of and the state and the Courts of state capital shall have exclusive jurisdiction in all matters arising under this Contract.

B. Subject Matter of Contract

3. Scope of Facilities

3.1 Unless otherwise expressly limited in the Technical Specifications, the Contractor's obligation shall include the provision of all Plant and Equipment and the performance of all Installation Services required for the design, the manufacture (including procurement, quality assurance, construction, installation, associated civil works, Precommissioning and delivery) of the Plant and Equipment and the installation, completion, commissioning and performance testing of the facilities in accordance with the plans, procedures, specifications, drawings, codes and any other documents as specified in the Technical specifications. Such specifications include, but are not limited to, the provision of supervision and engineering services; the supply of labour, materials, equipment, spare parts (as specified in GCC Sub-Clause 3.3 below) and accessories; Contractor's Equipment; construction utilities and supplies; temporary materials, structures and facilities; transportation (including without limitation, custom clearance, port handling, unloading and hauling to, from and at the Site); storage and training except for those supplies, works and services that will be provided or performed by the Employer.

3.2 The Contractor shall, unless specifically excluded in the Contract, perform all such work and/or supply all such items and materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Completion of the Facilities as if such work and/or items and materials were expressly mentioned in the Contract.

3.3 The supply of Mandatory Spare Parts, if any, shall be included in the Contract. Beside the aforesaid Mandatory Spares parts, the Contractor shall ensure the availability of spare parts required for the operation and maintenance of the Facilities to the Employer for a minimum period of 7 years from Completion of the Facilities. The Contractor shall carry sufficient inventories to ensure an ex-stock supply of consumable spares for the plant and equipment. If so desired by the Employer, the Contractor shall submit the specifications, price and the terms and conditions relating to the supply thereof for such spares identified by the Employer with validity period of 6 months within 30 days of receipt of request from Employer for its consideration and placement of order.

3.4 The Contractor shall guarantee that in the event of termination of production of spare parts by the Contractor or his Sub-Contractor:

(i) The Contractor shall send advance notification to the Employer of the pending termination, with **2 (two) years time to permit** the Employer to procure needed requirements, and

(ii) Following such termination, the Contractor shall furnish at no cost to the Employer the blueprints, drawings and specification of the spare parts, if requested.

3.5 In case the Contractor fails to supply the spares parts in accordance with the terms stipulated above, the Employer shall sanction the Contractor declaring them ineligible for a stated period of time for future projects.

4. Time for Commencement and Completion

4.1 The Contractor shall commence work on the Facilities from the Effective Date of Contract and without prejudice to GCC Sub-Clause 21.2 hereof, the Contractor shall thereafter proceed with the Facilities in accordance with the time schedule.

4.2 The Contractor shall attain Completion of the Facilities (or of a part where a separate time for Completion of such part is specified in the Contract) within the time stated under Time for Completion or within such extended time to which the Contractor shall be entitled under GCC Clause 34 hereof.

5. Contractor's Responsibilities

5.1 The Contractor shall design, manufacture (including associated purchases and/or subcontracting), install and complete the Facilities with due care and diligence in accordance with the Contract.

5.2 The Contractor confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the Facilities (including any data as to boring tests) provided by the Employer, and on the basis of information that the Contractor could have obtained from a visual inspection of the Site (if access thereto was available) and of other data readily available to it relating to the Facilities as of the date twenty-eight (28) days prior to bid submission. The Contractor acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Facilities.

5.3 The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the performance of the Contract, including, without limitation, visas for the Contractor's and Subcontractor's personnel and entry permits for all imported Contractor's Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Employer under GCC Sub-Clause 6.3 hereof and that are necessary for the performance of the Contract.

5.4 The Contractor shall comply with all laws in force in **State**. The laws will include all local, state, national or other laws that affect the performance of the Contract and bind upon the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the Subcontractors and their personnel, but without prejudice to GCC Sub-Clause 6.1 hereof.

5.5 Any Plant, Material and Services that will be incorporated in or be required for the Facilities and other supplies shall have their origin as specified under GCC Sub-Clause 2.12 (Country of Origin).

5.6 The Contractor shall permit the Employer to inspect the Contractor's accounts and records relating to the performance of the Contractor.

6. Employer's Responsibilities

6.1 The Employer shall ensure the accuracy of all information and/or data to be supplied by the Employer, except when otherwise expressly stated in the Contract.

6.2 The Employer shall be responsible for acquiring and providing legal and physical possession of the Site and access thereto, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract, including all requisite rights of way. The Employer shall give full possession of and accord all rights of access thereto on or before the date(s) specified in that Appendix.

6.3 If requested by the Contractor, the Employer shall use its best endeavors to assist the Contractor in obtaining in a timely and expeditious manner all permits, approvals and/or licenses necessary for the execution of the Contract from all local, state **or national**

government authorities or public service undertakings that such authorities or undertakings require the Contractor or Subcontractors or the personnel of the Contractor or Subcontractors, as the case may be, to obtain.

6.4 Unless otherwise specified in the Contract or agreed upon by the Employer and the Contractor, the Employer shall provide sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, utilities, lubricants, chemicals, catalysts, other materials and facilities; and shall perform all work and services of whatsoever nature, to enable the Contractor to properly carry out Commissioning, at or before the time specified in the program furnished by the Contractor under GCC Sub-Clause 14.2 (Program of Performance) hereof and in the manner thereupon specified or as otherwise agreed upon by the Employer and the Contractor.

6.5 The Employer shall be responsible for the continued operation of the Facilities after Taking Over, in accordance with GCC Sub-Clause 20.1.5.

6.6 All costs and expenses involved in the performance of the obligations under this GCC Clause 6 shall be the responsibility of the Employer.

C. Payment

7. Contract Price

7.1 The Contract Price shall be increased or reduced on account of variation in quantity in accordance with Clause 33 of GCC.

7.2 Subject to GCC Sub-Clauses 5.2 and 6.1 hereof, the Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

8. Terms of Payment

8.1 The Contract Price shall be paid as specified in Section -3 (BDS)

8.2 All payments under the Contract shall be made in **Indian Rupees**.

9. Securities

9.1 Issuance of Securities

The Contractor shall provide the securities specified below in favor of the Employer at the times, and in the amount, manner and form specified below.

9.2 Performance Security

9.2.1 The Contractor shall, within twenty-eight (28) days of the notification of award, provide a performance security for the due performance of the Contract in the amount equivalent to Ten percent (10%) of the Contract Price, with a validity upto ninety (90) days beyond the Defect Liability Period. The same shall be extended by the Contractor time to time till ninety (90) days beyond the actual Defect Liability Period, as may be required under the Contract.

Apart from the Contractor's performance security, the Contractor shall be required to arrange additional performance securities, as specified in **SCC**, within twenty-eight (28) days of the notification of award in favour of the Employer in the form acceptable to the Employer.

9.2.2 The performance security shall be in the Form of unconditional Bank Guarantee attached hereto in the Section VI - Sample Forms and Procedures.

9.2.3 Reduction in the security pro rata to the Contract Price of any part of the Facilities is not admissible. However, if the Defects Liability Period has been extended on any part of the Facilities pursuant to GCC Sub-Clause 22.8 hereof, the Contractor shall issue an additional security in an amount proportionate to the Contract Price of that part. The security shall be returned to the Contractor immediately after its expiration, provided, however, that if the Contractor pursuant to GCC Sub-Clause 22, is liable for an extended warranty obligation, the performance security shall be reduced to ten percent (10%) of the value of the component covered by the extended warranty.

9.2.4 In case of award of the contract to a Joint Venture, the Bank Guarantee for performance security shall be submitted in the name of all the partner(s) of the Joint Venture

9.3 Issuing Banks

The Bank Guarantee for Performance Security is to be provided by the Contractor, which should be issued either :

(a) by a Public Sector Bank located in India, or

(b) a scheduled Indian Bank having paid up capital (net of any accumulated losses) of Rs. 1,000 Million or above (the latest annual report of the Bank should support compliance of capital adequacy ratio requirement), or

(c) by a foreign bank or a subsidiary of a foreign bank, located in India with overall international corporate rating or rating of long term debt not less than A- (A minus) or equivalent by a reputed rating agency.

9.4 Indemnity

9.4.1 For the equipment/material to be provided by the Contractor, it will be the responsibility of the Contractor to take delivery, unload and store the materials at Site and execute an Indemnity Bond and obtain authorisation letter from Employer as per proforma enclosed at Section VI (Sample Forms and Procedures), in favour of the Employer against loss, damage and any risks involved for the full value of the materials. This Indemnity Bond shall be furnished by the Contractor before commencement of the supplies and shall be valid till the scheduled date of Taking Over of the equipment by the Employer.

9.4.2 In case of divisible Contracts, where the Employer hands over his equipment to the Contractor for executing the Contract, then the Contractor shall, at the time of taking delivery of the equipment through Bill of Lading or other despatch documents, furnish trust Receipt for Plant, Equipment and Materials and also execute an Indemnity Bond in favour of the Employer in the form acceptable to the Employer for keeping the equipment in safe custody and to utilize the same exclusively for the purpose of the said Contract. Samples of proforma for the Trust receipt and Indemnity Bond are enclosed under Section VI (Sample Forms and Procedures). The Employer shall also issue a separate Authorization Letter to the Contractor to enable him to take physical delivery of plant, equipment and materials from the Employer as per proforma enclosed under Section VI (Sample Forms and Procedures).

10. Taxes and Duties

10.1 The Contractor shall be entirely responsible for payment of all taxes, duties, license fees and other such levies legally payable/incurred until delivery of the contracted supplies to the Employer.

If it is statutory requirement to make deductions towards such taxes and duties or any other applicable taxes and duties, the same shall be made by the Employer and a certificate for the same shall be issued to the Contractor.

10.2 The Contractor shall be solely responsible for the taxes that may be levied on the Contractor's persons or on earnings of any of his employees and shall hold the Employer indemnified and harmless against any claims that may be made against the Employer. The Employer does not take any responsibility whatsoever regarding taxes under Indian Income Tax Act, for the Contractor or his personnel. If it is obligatory under the provisions of the Indian Income Tax Act, deduction of Income Tax at source shall be made by the Employer.

10.3 In respect of direct transaction between the Employer and the Contractor, the EXW price is inclusive of all cost as well as duties and tax (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable on components, raw materials and any other items used for their consumption incorporated or to be incorporated in the Plant & Equipment.

Sales tax/VAT, excise duty, local tax and other levies for the Equipment/items under 'direct transaction' including octroi/entry tax as applicable for destination site/state are not included in the EXW price. These amounts will be payable (along with subsequent variation if any), by the Employer on the supplies made by the Contractor but limited to the tax liability on the transaction between the Employer and the Contractor. Employer shall, however, issue requisite sales tax declaration form.

In respect of bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Employer's site (sale-in-transit), the EXW price is inclusive of all cost as well as duties and taxes (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable and any such taxes, duties, levies additionally payable will be to Contractor's account and no separate claim on this behalf will be entertained by the Employer. Employer, shall, however, issue requisite sales tax declaration forms.

Further, the EXW price of (i) imported Equipments/items offered as 'Off the Shelf' or dispatched directly from the Indian Port of disembarkation and/or (ii) bought-out finished Equipments/items as 'Off the Self' items or dispatched directly from the Contractor's works are inclusive of all cost as well as duties and taxes (viz., custom duties & levies, duties, sales tax/VAT etc.) paid or payable and no separate claim on this behalf will be entertained by the Employer. Employer shall, however, issue requisite sales tax declaration form.

For payment/reimbursement of Sales Tax, wherever applicable, in respect of despatches made directly from Contractor's works, invoices raised by the Contractor shall be accepted as documentary evidence and for payment/reimbursement of VAT, VATABLE invoices raised by the Contractor shall be accepted as documentary evidence. Similarly, pre-numbered invoices duly signed by authorized signatory shall be considered as evidence for payment of Excise Duty.

10.4 Octroi/entry tax as applicable for destination site/state on all items of supply including bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Employer's site (sale-in-transit) are not included in the Contract price. The applicable octroi/entry tax in respect of all the items of supply would be reimbursed to the Contractor separately by the Employer subject to furnishing of documentary proof.

10.5 Employer would not bear any liability on account of Service Tax. Employer shall, however, deduct such tax at source as per the rules and issue necessary Certificate to the Contractor.

10.6 Sales Tax/VAT on Works Contract, Turnover Tax or any other similar taxes under the Sales Tax/VAT Act for services to be performed in India, as applicable is included in Contract Price and Employer would not bear any liability on this account. Employer shall, however, deduct such taxes at source as per the rules and issue Tax Deduction at Source (TDS) Certificate to the Contractor.

10.7 For the purpose of the Contract, it is agreed that the Contract Price specified in Article 2(Contract Price and Terms of Payment) of the Contract Agreement is based on the taxes, duties, levies and charges prevailing at the date seven (07) days prior to the last date of bid submission (hereinafter called "Tax" in this GCC Sub-clause 10.7). If any rates of Tax are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of the Contract, which was or will be assessed on the Contractor in connection with performance of the Contract, an equitable adjustment of the Contract price shall be made to fully take into account any such change by addition to the Contract price or deduction there from, as the case may be, in accordance with GCC Clause 31 (Changes in Laws and Regulations) hereof. However, these adjustments would be restricted to direct transactions between the Employer and the Contractor for which the taxes and duties are reimbursable by the Employer as per the Contract. These adjustments shall not be applicable on procurement of raw materials, intermediary

components etc by the Contractor and also not applicable on the bought out items dispatched directly from sub-vendor's works to site.

In respect of raw materials, intermediary components etc and bought out items, neither the Employer nor the Contractor shall be entitled to any claim arising due to increase or decrease in the rate of Tax, introduction of a new Tax or abolition of an existing Tax in the course of the performance of the Contract.

D. Intellectual Property

11. Copy Right

11.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer directly or through the Contractor by any third party, including supplies of materials, the copyright in such materials shall remain vested in such third party.

The Employer shall however be free to reproduce all drawings, documents and other material furnished to the Employer for the purpose of the Contract including, if required, for operation and maintenance.

11.2 The copyright in all drawings, documents and other materials containing data and information furnished to the Contractor by the Employer herein shall remain vested in the Employer.

12. Confidential Information

12.1 The Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this GCC Clause 12.

12.2 The Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Employer for any purpose other than the design, procurement of Plant and Equipment, construction or such other work and services as are required for the performance of the Contract.

12.3 The obligation of a party under GCC Sub-Clauses 12.1 and 12.2 above, however, shall not apply to that information which

(a) now or hereafter enters the public domain through no fault of that party

(b) can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto

(c) otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

12.4 The above provisions of this GCC Clause 12 shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

12.5 The provisions of this GCC Clause 12 shall survive termination, for whatever reason, of the Contract.

E. Execution of the Facilities

13. Representatives

13.1 If the Project Manager is not named in the Contract, then within fourteen (14) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager. The Employer may from time to time appoint some other person as the project Manager in place of the person previously so appointed, and shall give a notice of the name of such other person to the Contractor without delay. The Employer shall take all reasonable care to see that no such appointment is made at such a time or in such a manner as to impede the progress of work on the Facilities. The Project Manager shall represent and act for the Employer at all times during the currency of the Contract. All notices, instructions, orders, certificates, approvals and all other

communications under the Contract shall be given by the Project Manager, except as herein otherwise provided.

All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager, except as herein otherwise provided.

13.2 Contractor's Representative & Construction Manager

13.2.1 If the Contractor's Representative is not named in the Contract, then within fourteen (14) days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing to approve the person so appointed. If the Employer makes no objection to the appointment within fourteen (14) days, the Contractor's Representative shall be deemed to have been approved. If the Employer objects to the appointment within fourteen (14) days giving the reason therefore, then the Contractor shall appoint a replacement within fourteen (14) days of such objection, and the foregoing provisions of this GCC Sub-Clause 13.2.1 shall apply thereto.

13.2.2 The Contractor's Representative shall represent and act for the Contractor at all times during the currency of the Contract and shall give to the Project Manager all the Contractor's notices, instructions, information and all other communications under the Contract. All notices, instructions, information and all other communications given by the Employer or the Project Manager to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided. The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer's prior written consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in GCC Sub-Clause 13.2.1.

13.2.3 The Contractor's Representative may, subject to the approval of the Employer (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative, and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Employer and the Project Manager. Any act or exercise by any person of powers, functions and authorities so

delegated to him or her in accordance with this GCC Sub-Clause 13.2.3 shall be deemed to be an act or exercise by the Contractor's Representative.

13.2.3.1 Notwithstanding anything stated in GCC Sub-Clause 13.1 and 13.2.1 above, for the purpose of execution of Contract, the Employer and the Contractor shall finalize and agree to a Contract Co-ordination Procedure and all the communication under the Contract shall be in accordance with such Contract Coordination Procedure.

13.2.4 From the commencement of installation of the Facilities at the Site until Operational Acceptance, the Contractor's Representative shall appoint a suitable person as the construction manager, (hereinafter referred to as "the Construction Manager"). The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site through-out normal working hours except when on leave, sick or absent for reasons connected with the proper performance of the Contract. Whenever the Construction Manager is absent from the Site, a suitable person shall be appointed to act as his or her deputy.

13.2.5 The Employer may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be incompetent or negligent, or may commit a serious breach of the Site regulations provided under GCC Sub-Clause 18.3. The Employer shall provide evidence of the same, whereupon the Contractor shall remove such person from the Facilities.

13.2.6 If any representative or person employed by the Contractor is removed in accordance with GCC Sub-Clause 13.2.5, the Contractor shall, where required, promptly appoint a replacement.

14. Work Program

14.1 Contractor's Organization

The Contractor shall supply to the Employer and the Project Manager a chart showing the proposed organization to be established by the Contractor for carrying out work on the Facilities. The chart shall include the identities of the key personnel together with the curricula vitae of such key personnel to be employed within twenty-one (21) days of the Effective Date. The Contractor shall promptly inform the Employer and the Project Manager in writing of any revision or alteration of such an organization chart.

14.2 Program of Performance

The Contractor shall update and revise the program (in addition to Vol II Section-5) as and when appropriate or when required by the Project Manager, but without modification in the Times for Completion under GCC Sub-Clause 4.2 and any extension granted in accordance with GCC Clause 34, and shall submit all such revisions to the Project Manager.

14.3 Progress Report

The Contractor shall monitor progress of all the activities specified in the program referred to in GCC Sub-Clause 14.2 above, and supply a progress report to the Project Manager every month.

The progress report shall be in a form acceptable to the Project Manager and shall indicate: (a) percentage completion achieved compared with the planned percentage completion for each activity; and (b) where any activity is behind the program, giving comments and likely consequences and stating the corrective action being taken.

14.4 Progress of Performance

If at any time the Contractor's actual progress falls behind the program referred to in GCC Sub-Clause 14.2, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager, prepare and submit to the Project Manager a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager of the steps being taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion under GCC Sub-Clause 4.2, any extension thereof entitled under GCC Sub-Clause 34.1, or any extended period as may otherwise be agreed upon between the Employer and the Contractor.

14.5 Work Procedures

The Contract shall be executed in accordance with the Contract Documents and the procedures given in the section on Sample Forms and Procedures of the Contract Documents.

The Contractor may execute the Contract in accordance with its own standard project execution plans and procedures to the extent that they do not conflict with the provisions contained in the Contract.

15. Subcontracting

15.1 The Contract specifies major items of supply or services and a list of approved Subcontractors against each item, including vendors. Insofar as no Subcontractors are listed against any such item, the Contractor shall prepare a list of Subcontractors for such item for inclusion in such list. The Contractor may from time to time propose any addition to or deletion from any such list. The Contractor shall submit any such list or any modification thereto to the Employer for its approval in sufficient time so as not to impede the progress of work on the Facilities. Such approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties or responsibilities under the Contract.

15.2 The Contractor shall select and employ its Subcontractors for such major items from those listed in the lists referred to in GCC Sub-Clause 15.1.

15.3 For items or parts of the Facilities not specified in the corresponding Contract ,the Contractor may employ such Subcontractors as it may select, at its discretion.

16. Design and Engineering

16.1 Specifications and Drawings

16.1.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good engineering practice.

The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Employer.

16.1.2 The Contractor shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designated by or on behalf of the Employer, by giving a notice of such disclaimer to the Project Manager.

16.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of bid submission shall apply unless otherwise specified. During Contract execution, any changes in such codes and standards shall be applied after approval by the Employer and shall be treated in accordance with GCC Clause 33.

16.3 Approval/Review of Technical Documents by Project Manager

16.3.1 The Contractor shall prepare (or cause its Subcontractors to prepare) and furnish to the Project Manager the list of documents for its approval or review as specified and as in accordance with the requirements of GCC Sub-Clause 14.2 (Program of Performance).

Any part of the Facilities covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval thereof.

GCC Sub-Clauses 16.3.2 through 16.3.7 shall apply to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for its review only.

16.3.2 Within twenty one (21) days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GCC Sub-Clause 16.3.1, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Project Manager proposes.

16.3.3 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.

16.3.4 If the Project Manager disapproves the document, the Contractor shall modify the document and resubmit it for the Project Manager's approval in accordance with GCC Sub-Clause 16.3.2. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), and upon resubmission with the required modifications the document shall be deemed to have been approved.

The procedure for submission of the documents by the Contractor and their approval by the Project Manager shall be discussed and finalized with the Contractor.

16.3.5 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be referred to an Arbitrator for determination in accordance with GCC Sub-Clause 39 hereof. If such dispute or difference is referred to an Arbitrator, the Project Manager shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Arbitrator upholds the Contractor's view on the dispute and if the Employer has not given notice under GCC Sub-Clause 39 hereof, then the Contractor shall be reimbursed by the Employer for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Arbitrator shall decide, and the Time for Completion shall be extended accordingly.

16.3.6 The Project Manager's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager.

16.3.7 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manager an amended document and obtained the Project Manager's approval thereof, pursuant to the provisions of this GCC Sub-Clause 16.3. If the Project Manager requests any change in any already approved document and/or in any document based thereon, the provisions of GCC Clause 33 shall apply to such request.

17. Plant and Equipment

17.1 Subject to GCC Sub-Clause 10.2, the Contractor shall manufacture or procure and transport all the Plant and Equipment (including Hardware & Software also) in an expeditious and orderly manner to the Site.

17.2 Transportation

17.2.1 The Contractor shall at its own risk and expense transport all the Plant and Equipment and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances.

17.2.2 Unless otherwise provided in the Contract, the Contractor shall be entitled to select any safe mode of transport operated by any person to carry the Plant and Equipment and the Contractor's Equipment.

17.2.3 Upon dispatch of each shipment of the Plant and Equipment and the Contractor's Equipment, the Contractor shall notify the Employer by telex, facsimile or Electronic Data Interchange (EDI) of the description of the Plant and Equipment and of the Contractor's Equipment, the point and means of dispatch, and the estimated time and point of arrival in the country where the Site is located, if applicable, and at the Site. The Contractor shall furnish the Employer with relevant shipping documents to be agreed upon between the parties.

17.2.4 The Contractor shall be responsible for obtaining, if necessary, approvals from the authorities for transportation of the Plant and Equipment and the Contractor's Equipment to the Site. The Employer shall use its best endeavors in a timely and expeditious manner to assist the Contractor in obtaining such approvals, if requested by the Contractor. The Contractor shall indemnify and hold harmless the Employer from and against any claim for damage to roads, bridges or any other traffic facilities that may be caused by the transport of the Plant and Equipment and the Contractor's Equipment to the Site.

17.3 Delivery and Documents

17.3.1 Delivery Documents

Upon shipment, the Contractor shall notify the Employer with full details of the dispatch and shall furnish the documents as specified in the corresponding Appendix - 1 (Terms and Procedures of Payment) to the Contract Agreement

17.3.2 Packing

17.3.2.1 The Contractor shall provide such packing of the Goods as it is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit

and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods final destination and the absence of heavy handling facilities at all points in transit.

17.3.2.2 The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract and, subject to any subsequent instruction ordered by the Employer consistent with the requirements of the Contract.

18. Installation

18.1 Setting Out/Supervision/Labor

18.1.1 Bench Mark: The Contractor shall be responsible for the true and proper setting-out of the Facilities in relation to bench marks, reference marks and lines provided to it in writing by or on behalf of the Employer.

If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level or alignment of the Facilities, the Contractor shall forthwith notify the Project Manager of such error and, at its own expense, immediately rectify such error to the reasonable satisfaction of the Project Manager. If such error is based on incorrect data provided in writing by or on behalf of the Employer, the expense of rectifying the same shall be borne by the Employer.

18.1.2 Contractor's Supervision: The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand.

18.1.3 Labor:

(a) The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi-skilled and unskilled labor as is necessary for the proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.

(b) Unless otherwise provided in the Contract, the Contractor at its own expense shall be responsible for the recruitment, transportation, accommodation and catering of all labor, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.

(c) The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labor of its Subcontractors.

(d) The Contractor shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor.

18.2 Contractor's Equipment

18.2.1 All Contractor's Equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Project Manager's consent that such Contractor's Equipment is no longer required for the execution of the Contract.

18.2.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site and any surplus materials remaining thereon.

18.2.3 The Employer will, if requested, use its best endeavors to assist the Contractor in obtaining any local, state or national government permission required by the Contractor for the export of the Contractor's Equipment imported by the Contractor for use in the execution of the Contract that is no longer required for the execution of the Contract.

18.3 Site Regulations and Safety

The Employer and the Contractor shall establish Site regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. The Contractor shall prepare and submit to the Employer, with a copy to the Project Manager, proposed Site regulations for the Employer's approval, which approval shall not be unreasonably withheld.

Such Site regulations shall include, but shall not be limited to, rules in respect of security, safety of the Facilities, gate control, sanitation, medical care, and fire prevention.

18.3.1 Compliance with Labor Regulations

18.3.1.1 During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all applicable existing labor enactments and rules made thereunder, regulations notifications and byelaws of the State or Central Government or local authority and any other labor law (including rules), regulations bye laws that may be passed or notification that may be issued under any labor law in future either by the State or the Central Government or the local authority. The employees of the Contractor and the Sub-contractor in no case shall be treated as the employees of the Employer at any point of time.

18.3.1.2 The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments.

18.3.1.3 If the Employer is caused to pay under any law as principal employer such amounts as may be necessary to cause or observe, or for non observance of the provisions stipulated in the notifications/ byelaws/Acts/ Rules/regulations including amendments, if any, on the part of the Contractor, the Employer shall have the right to deduct any money due to the Contractor under this contract or any other contract with the employer including his amount of performance security for adjusting the aforesaid payment. The Employer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

Notwithstanding the above, the Contractor shall furnish to the Employer the details/documents evidencing the Contractor's compliance to the laws applicable to establishments engaged in building and other construction works, as may be sought by the Employer. In particular the Contractor shall submit quarterly certificate regarding compliance in respect of provisions of Employees' Provident Fund and Misc. Provisions Act 1952 to the Employer.

18.3.1.4 Salient features of some major laws applicable to establishments engaged in building and other construction works:

(a) Workmen Compensation Act 1923: The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

(b) Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

(c) Employee P.F. and Miscellaneous Provision Act 1952: The Act provides for monthly contribution by the employer plus workers @10% or 8.33%. The benefits under the Act are:

(i) Pension or family pension on retirement or death, as the case may be.

(ii) Deposit linked insurance on death in harness of the worker.

(iii) Payment of P.F. accumulation on retirement/death etc.

(d) Maternity Benefit Act 1951: The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

(e) Contract Labour (Regulation & Abolition) Act 1970: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by law. The Principal Employer is required to take Certification of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer if they employ 20 or more labour contract labour.

(f) Minimum Wages Act 1948: The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provision of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employments.

(g) Payment of Wages Act 1936: It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

(h) Equal Remuneration Act 1979: The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against Female employees in the matters of transfers, training and promotions etc.

(i) Payment of Bonus Act 1965: The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20% of wages to employees drawing Rs. 3500/- per month or less. The bonus is to be paid to employees getting Rs. 2500/- per month or above uptoRs. 3500/- per month shall be worked out by taking wages as Rs. 2500/- per month only. The Act does not apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

(j) Industrial Dispute Act 1947: the Act lays down the machinery the procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

(k) Industrial Employment (Standing Orders) Act 1946: It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.

(l) Trade Unions Act 1926: The Act lays down the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(m) Child Labour (Prohibition & Regulation) Act 1986: The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

(n) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service Act 1979: The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in

one state for employment in the establishment situated in another state). The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.

(o) The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996 : All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the government.

(p) Factories Act 1948: The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

18.3.2 Safety Precautions

18.3.2.1 In case any accident occurs during the construction/ erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Project Manager in prescribed form and also to all the authorities envisaged under the applicable laws.

18.3.2.2 The Project Manager shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipment. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary, appeal against the order of

stoppage of work to the Project Manager within 3 days of such stoppage of work and decision of the Project Manager in this respect shall be conclusive and binding on the Contractor.

18.3.2.3 The Contractor shall not be entitled for any damages/compensation for stoppage of work due to safety reasons as provided in GCC Sub-Clause 18.3.3.19 above and the period of such stoppage of work will not be taken as an extension of time for completion of work and will not be the ground for waiver of levy of liquidated damages.

18.3.2.4 It is mandatory for the Contractor to observe during the execution of the works, requirements of Safety Rules .

18.4 Emergency Work

If, by reason of an emergency arising in connection with and during the execution of the Contract, any protective or remedial work is necessary as a matter of urgency to prevent damage to the Facilities, the Contractor shall immediately carry out such work.

If the Contractor is unable or unwilling to do such work immediately, the Employer may do or cause such work to be done as the Employer may determine is necessary in order to prevent damage to the Facilities. In such event the Employer shall, as soon as practicable after the occurrence of any such emergency, notify the Contractor in writing of such emergency, the work done and the reasons therefor. If the work done or caused to be done by the Employer is work that the Contractor was liable to do at its own expense under the Contract, the reasonable costs incurred by the Employer in connection therewith shall be paid by the Contractor to the Employer. In case such work is not in the scope of the Contractor, the cost of such remedial work shall be borne by the Employer.

19. Test and Inspection

19.1 The Contractor shall at its own expense carry out at the place of manufacture and/or on the Site all such tests and/or inspections of the Plant and Equipment and any part of the Facilities as are specified in the Contract.

19.2 The Employer and the Project Manager or their designated representatives shall be entitled to attend the aforesaid test and/or inspection, provided that the Employer shall bear all costs and expenses incurred in connection with such attendance including, but not limited to, all traveling and board and lodging expenses.

19.3 Whenever the Contractor is ready to carry out any such test and/or inspection, the Contractor shall give four weeks advance notice of such test and/or inspection and of the place and time thereof to the Project Manager. The Contractor shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Employer and the Project Manager (or their designated representatives) to attend the test and/or inspection.

19.4 The Contractor shall provide the Project Manager with a certified report of the results of any such test and/or inspection.

If the Employer or Project Manager (or their designated representatives) fails to attend the test and/or inspection, or if it is agreed between the parties that such persons shall not do so, then the Contractor may proceed with the test and/or inspection in the absence of such persons, and may provide the Project Manager with a certified report of the results thereof.

19.5 The Project Manager may require the Contractor to carry out any test and/or inspection not required by the Contract, provided that the Contractor's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impedes the progress of work on the Facilities and/or the Contractor's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Completion and the other obligations so affected.

19.6 If any Plant and Equipment or any part of the Facilities fails to pass any test and/or inspection, the Contractor shall either rectify or replace such Plant and Equipment or part of the Facilities and shall repeat the test and/or inspection upon giving a notice under GCC Sub-Clause 19.3.

19.7 If any dispute or difference of opinion shall arise between the parties in connection with or arising out of the test and/or inspection of the Plant and Equipment or part of the Facilities that cannot be settled between the parties within a reasonable period of time, it may be referred to an Arbitrator for determination in accordance with GCC Sub-Clause 39.

19.8 The Contractor shall afford the Employer and the Project Manager, at the Employer's expense, access at any reasonable time to any place where the Plant and Equipment are being manufactured or the Facilities are being installed, in order to inspect the

progress and the manner of manufacture or installation, provided that the Project Manager shall give the Contractor a reasonable prior notice.

19.9 The Contractor agrees that neither the execution of a test and/or inspection of Plant and Equipment or any part of the Facilities, nor the attendance by the Employer or the Project Manager, nor the issue of any test certificate pursuant to GCC Sub-Clause 19.4, shall release the Contractor from any other responsibilities under the Contract.

19.10 No part of the Facilities or foundations shall be covered up on the Site without the Contractor carrying out any test and/or inspection required under the Contract. The Contractor shall give a reasonable notice to the Project Manager whenever any such part of the Facilities or foundations is ready or about to be ready for test and/or inspection; such test and/or inspection and notice thereof shall be subject to the requirements of the Contract.

19.11 The Contractor shall uncover any part of the Facilities or foundations, or shall make openings in or through the same as the Project Manager may from time to time require at the Site, and shall reinstate and make good such part or parts.

If any parts of the Facilities or foundations have been covered up at the Site after compliance with the requirement of GCC Sub-Clause 19.10 and are found to be executed in accordance with the Contract, the expenses of uncovering, making openings in or through, reinstating, and making good the same shall be borne by the Employer, and the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been delayed or impeded in the performance of any of its obligations under the Contract.

20. Completion of the Facilities and Operational Acceptance

20.1 Completion of the Facilities

20.1.1 Physical Completion

20.1.1.1 As soon as the Facilities or any part thereof has, in the opinion of the Contractor, been completed operationally and structurally and put in a tight and clean condition as specified in the Technical Specifications, excluding minor items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Employer in writing.

20.1.2 Pre-Commissioning

20.1.2.1 Within seven (7) days after receipt of the notice from the Contractor under GCC Sub-Clause 20.1.1.1, the Project Manager shall deploy the operating and maintenance personnel and other material for Precommissioning of the Facilities or any part thereof.

20.1.2.2 As soon as reasonably practicable after the operating and maintenance personnel have been deployed by the Employer and other materials have been provided by the Employer in accordance with GCC Sub-Clause 20.1.2.1, the Contractor shall commence Precommissioning of the Facilities or the relevant part thereof, in presence of the Employer's representatives, as per procedures detailed in Technical Specifications in preparation for Commissioning.

20.1.2.3 As soon as all works in respect of Precommissioning are successfully completed and, in the opinion of the Contractor, the Facilities or any part thereof is ready for Commissioning, the Contractor shall notify the Project Manager in writing.

20.1.2.4 The Project Manager shall, within fourteen (14) days after receipt of the Contractor's notice under GCC Sub-Clause 20.1.2.3, notify the Contractor in writing of any defects and/or deficiencies.

20.1.2.5 If the Project Manager notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies, and shall repeat the procedure described in GCC Sub-Clause 20.1.2.2. If in the opinion of the Contractor, the Facilities or any part thereof is now ready for Commissioning, the Contractor shall again notify the Project Manager in writing. If further defects and/or deficiencies are not notified by the Project Manager and if the Project Manager is satisfied that the Precommissioning of Facilities or that part thereof have been successfully completed, the Project Manager shall, within seven (7) days after receipt of the Contractor's such notice, advise the Contractor to proceed with the Commissioning of the Facilities or part thereof.

20.1.2.6 If the Project Manager fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GCC Sub-Clause 20.1.2.4 or within seven (7) days after receipt of the Contractor's notice on completion of repeat procedure under GCC Sub-Clause 20.1.2.5, then the Precommissioning of the Facilities or that part thereof shall be considered to have been successfully completed as of the date of the Contractor's notice.

20.1.2.7 As soon as possible after Precommissioning, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

20.1.2.8 In the event that the Contractor is unable to proceed with the Precommissioning of the Facilities pursuant to Sub-Clause 20.1.2 for reasons attributable to the Employer either on account of non-availability of other facilities under the responsibilities of other contractor(s), or for reasons beyond the Employer's control, the following provisions shall apply:

When the Contractor is notified by the Project Manager that he will be unable to proceed with the activities and obligations pursuant to above GCC Sub-Clause 20.1.2.8, the Contractor shall be entitled to the following:

a) the Time of Completion shall be extended for the period of suspension without imposition of liquidated damages pursuant to GCC Sub-Clause 21.2.

b) payments due to the Contractor which would have not been payable in normal circumstances due to non-completion of the said activities and obligations, shall be released to the Contractor against submission of a security in the form of a bank guarantee of equivalent amount acceptable to the Employer, and which shall become null and void when the Contractor will have complied with its obligations regarding these payments, subject to the provisions of GCC Sub-Clause 21.2.9 below.

c) the expenses payable by the Contractor to the Bankers toward the extension of above security and extension of other securities under the Contract, of which validity need to be extended, shall be reimbursed to the Contractor by the Employer against documentary evidence.

d) the additional charges toward the care of the Facilities pursuant to GCC Sub-Clause 28.1 shall be reimbursed to the Contractor by the Employer for the period between the notification mentioned above and the notification mentioned in GCC Sub-Clause 20.1.2.10 below. The provisions of GCC Sub-Clause 29.2 shall apply to the Facilities during the same period.

20.1.2.9 In the event that the period of suspension under GCC Sub-Clause 20.1.2.8 actually exceeds one hundred eighty (180) days, the Employer and the Contractor shall mutually agree to any additional compensation payable to the Contractor.

20.1.2.10 As and when, after the period of suspension under GCC Sub-Clause 20.1.2.8, the Contractor is notified by the Project Manager that the Facilities are ready for Precommissioning, the Contractor shall proceed without delay in performing all activities and obligations under the Contract.

20.1.3 Commissioning

20.1.3.1 Commissioning of the Facilities or any part thereof shall be commenced by the Contractor immediately after being advised by the Project Manager, pursuant to GCC Sub-Clause 20.1.2.5 or immediately after the Precommissioning is considered to be completed under GCC Sub-Clause 20.1.2.6.

20.1.3.1.1 Commissioning of the Facilities or any part thereof shall be completed by the Contractor as per procedures detailed in Technical Specifications.

20.1.3.2 The Employer deploy the operating and maintenance personnel and supply all raw materials, utilities, lubricants, chemicals, catalysts, facilities, services and other materials required for commissioning.

20.1.3.3 In the event that the Contractor is unable to proceed with the Commissioning of the Facilities pursuant to Sub-Clause 20.1.3 for reasons attributable to the Employer either on account of non-availability of other facilities under the responsibilities of other contractor(s), or for reasons beyond the Employer's control, the provisions of GCC Sub-Clause 20.1.2.8 to 20.1.2.9 shall apply.

20.1.3.4 As and when, after the period of suspension under GCC Sub-Clause 20.1.2.8, the Contractor is notified by the Project Manager that the Facilities are ready for Commissioning, the Contractor shall proceed without delay in performing all activities and obligations under the Contract.

20.1.4 Trial – Operation

20.1.4.1 Trial – Operation of the Facilities or any part thereof shall be commenced by the Contractor immediately after the Commissioning is completed pursuant to GCC Sub-Clause 20.1.3.1.1.

20.1.4.2 Trial – Operation of the Facilities or any part thereof shall be completed by the Contractor for the period specified in Technical Specification (or for a continuous period of 24 hours where such period in not specified in Technical Specification) and as per procedures detailed in Technical Specifications.

20.1.4.3 At any time after the events set out in GCC Sub-Clause 20.1.4.2 have occurred, the Contractor may give a notice to the Project Manager requesting the issue of an Taking Over Certificate in the form provided in the Bidding Documents or in another form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as of the date of such notice.

20.1.4.4 The Project Manager shall within twenty-one (21) days after receipt of the Contractor's notice, issue an Taking Over Certificate.

20.1.5 Taking Over

20.1.5.1 Upon successful Trial – Operation of the Facilities or any part thereof, pursuant to GCC Sub-Clause 20.1.4, the Project Manager shall issue to the Contractor a Taking Over Certificate as a proof of the acceptance of the Facilities or any part thereof. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of Contract after issue of such certificate.

20.1.5.2 If within thirty (30) days after receipt of the Contractor's notice, the Project Manager fails to issue the Taking Over Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Project Manager has not issued the Taking Over Certificate, the Facilities or the relevant part thereof shall be deemed to have been Taken Over as at the date of the Contractor's said notice.

20.1.5.3 Upon Taking Over of the Facilities or any part thereof, the Employer shall be responsible for the care and custody of the Facilities or the relevant part thereof, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof.

20.2 Operational Acceptance

20.2.1 Guarantee Test

20.2.1.1 The Guarantee Test (and repeats thereof), if any specified in the SCC and/or the Technical Specification, shall be conducted by the Contractor after successful Trial –

Operation of the Facilities or the relevant part thereof to ascertain whether the Facilities or the relevant part can attain the Functional Guarantees specified in the Contract Documents or if otherwise required as per the Technical Specifications. The Contractor's and Project Manager's advisory personnel may witness the Guarantee Test. The Contractor shall promptly provide the Employer with such information as the Employer may reasonably require in relation to the conduct and results of the Guarantee Test (and any repeats thereof).

20.2.1.2 If for reasons not attributable to the Contractor, the Guarantee Test of the Facilities or the relevant part thereof cannot be successfully completed within the time stipulated in the Technical Specifications the period for completing the same shall be as agreed upon by the Employer and the Contractor.

20.2.2 Operational Acceptance

20.2.2.1 Operational Acceptance shall occur in respect of the Facilities or any part thereof as mentioned below:

(I) In case no Functional Guarantees are applicable, Operational Acceptance shall occur when the Facilities or part thereof have been successfully Commissioned and Trial – Operation for the specified period have been successfully completed

(II) In case Functional Guarantees are applicable, Operational Acceptance shall occur when the Functional Guarantees are met or the Contractor has paid liquidated damages specified in GCC Sub-Clause 23.3 hereof; or

20.2.2.2 At any time after any of the events set out in GCC Sub-Clause 20.2.2.1 have occurred, the Contractor may give a notice to the Project Manager requesting the issue of an Operational Acceptance Certificate in the form provided in the Bidding Documents or in another form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as of the date of such notice.

20.2.2.3 The Project Manager shall within thirty (30) days after receipt of the Contractor's notice, issue an Operational Acceptance Certificate.

20.2.2.4 Upon Operational Acceptance, pursuant to GCC Sub-Clause 20.2.2.2, the Project Manager shall issue to the Contractor aOperational Acceptance Certificate as a proof of the final acceptance of the Plant and Equipment. Such certificate shall not relieve the

Contractor of any of his obligations which otherwise survive, by the terms and conditions of Contract after issue of such certificate.

20.2.2.5 If within twenty one (21) days after receipt of the Contractor's notice, the Project Manager fails to issue the Operational Acceptance Certificate or fails to inform the Contractor in writing of the justifiable reasons why the Project Manager has not issued the Operational Acceptance Certificate, the Facilities or the relevant part thereof shall be deemed to have been accepted as at the date of the Contractor's said notice.

F. Guarantees and Liabilities

21. Completion Time Guarantee

21.1 The Contractor guarantees that it shall attain Completion of the Facilities (or a part for which a separate time for completion is specified in the SCC) within the Time for Completion specified in the **SCC** pursuant to GCC Sub-Clause 4.2, or within such extended time to which the Contractor shall be entitled under GCC Clause 34 hereof.

21.2 If the Contractor fails to comply with the Time for Completion in accordance with Clause GCC 21 for the whole of the facilities, (or a part for which a separate time for completion is agreed) then the Contractor shall pay to the Employer a sum equivalent to half percent (0.5%) of the Contract Price as liquidated damages for such default and not as a penalty, without prejudice to the Employer's other remedies under the Contract, for each week or part thereof which shall elapse between the relevant Time for Completion and the date stated in Taking Over Certificate of the whole of the Works (or a part for which a separate time for completion is agreed) subject to the limit of five percent (5%) of Contract Price. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract.

21.3 No bonus will be given for earlier Completion of the Facilities or part thereof.

22. Defect Liability

22.1 The Contractor warrants that the Facilities or any part thereof shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.

22.2 The Defect Liability Period shall be twelve (12) months from the date of Taking Over /Completion of Facilities (or any part thereof).

If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Plant and Equipment (includes hardware and software) supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Facilities caused by such defect. The Contractor shall not be responsible for the repair, replacement or making good of any defect or of any damage to the Facilities arising out of or resulting from any of the following causes:

(a) improper operation or maintenance of the Facilities by the Employer

(b) operation of the Facilities outside specifications provided in the Contract

(c) normal wear and tear.

22.3 The Contractor's obligations under this GCC Clause 22 shall not apply to

(a) any materials that are supplied by the Employer under GCC Sub-Clause 17.2, are normally consumed in operation, or have a normal life shorter than the Defect Liability Period stated herein

(b) any designs, specifications or other data designed, supplied or specified by or on behalf of the Employer or any matters for which the Contractor has disclaimed responsibility herein

(c) any other materials supplied or any other work executed by or on behalf of the Employer, except for the work executed by the Employer under GCC Sub-Clause 22.7.

22.4 The Employer shall give the Contractor a notice stating the nature of any such defect together with all available evidence thereof, promptly following the discovery thereof. The Employer shall afford all reasonable opportunity for the Contractor to inspect any such defect.

22.5 The Employer shall afford the Contractor all necessary access to the Facilities and the Site to enable the Contractor to perform its obligations under this GCC Clause 22. The

Contractor may, with the consent of the Employer, remove from the Site any Plant and Equipment or any part of the Facilities that are defective if the nature of the defect, and/or any damage to the Facilities caused by the defect, is such that repairs cannot be expeditiously carried out at the Site.

22.6 If the repair, replacement or making good is of such a character that it may affect the efficiency of the Facilities or any part thereof, the Employer may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests.

If such part fails the tests, the Contractor shall carry out further repair, replacement or making good (as the case may be) until that part of the Facilities passes such tests.

22.7 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than fifteen (15) days), the Employer may, following notice to the Contractor, proceed to do such work, and the reasonable costs incurred by the Employer in connection therewith shall be paid to the Employer by the Contractor or may be deducted by the Employer from any monies due the Contractor or claimed under the Performance Security.

22.8 If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Employer because of any of the aforesaid reasons.

Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the Defect Liability Period extended by a period mentioned in GCC Sub-Clause 22.2 from the time of such replacement/repair of the facilities or any part thereof.

22.8.1 At the end of the Defect Liability Period, the Contractor's Liability ceases except for latent defects. The Contractor's liability for latent defects warranty shall be limited to period of ten (10) years from the end of Defect Liability Period. For the purpose of this clause, the

latent defects shall be the defects inherently lying within the material or arising out of design deficiency, which do not manifest themselves during the Defect Liability Period defined in this GCC Clause 22, but later.

22.9 Except as provided in GCC Clauses 22 and 29, the Contractor shall be under no liability whatsoever and howsoever arising, and whether under the Contract or at law, in respect of defects in the Facilities or any part thereof, the Plant and Equipment, design or engineering or work executed that appear after Defect Liability Period except for the liability towards obligations that may survive in terms of the Contract after Defect Liability Period, except where such defects are the result of the gross negligence, fraud, criminal or willful action of the Contractor.

23. Functional Guarantees

23.1 The Contractor guarantees that the Facilities and all parts thereof shall attain the Functional Guarantees specified in the Technical Specifications, subject to and upon the conditions therein specified.

23.2 If, for reasons attributable to the Contractor, the minimum level of the Functional Guarantees specified in the Technical Specifications are not met either in whole or in part, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the Plant or any part thereof as may be necessary to meet at least the minimum level of such Guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications and / or additions, and shall request the Employer to repeat the Guarantee Test until the minimum level of the Guarantees has been met. If the Contractor eventually fails to meet the minimum level of Functional Guarantees, the Employer may consider termination of the Contract pursuant to GCC Sub-Clause 36.2.2 and recover the payments already made to the Contractor.

23.3 If, for reasons attributable to the Contractor, the Functional Guarantees specified in the Technical Specifications are not attained either in whole or in part, but the minimum level of the Functional Guarantees specified in the Technical Specifications is met, the Contractor shall, at the Contractor's option, either

(a) make such changes, modifications and/or additions to the Facilities or any part thereof that are necessary to attain the Functional Guarantees at its cost and expense within a mutually agreed time and shall request the Employer to repeat the Guarantee Test, or

(b) pay liquidated damages to the Employer in respect of the failure to meet the Functional Guarantees in accordance with the provisions in the **SCC**.

23.4 In case the Employer exercises its option to accept the equipment after levy of liquidated damages, the payment of liquidated damages under GCC Sub-Clause 23.3, upto the limitation of liability specified in the **SCC**, shall completely satisfy the Contractor's guarantees under GCC Sub-Clause 23.3, and the Contractor shall have no further liability whatsoever to the Employer in respect thereof. Upon the payment of such liquidated damages by the Contractor, the Project Manager shall issue the Operational Acceptance Certificate for the Facilities or any part thereof in respect of which the liquidated damages have been so paid.

24. Equipment Performance Guarantees

24.1 The Contractor guarantees that the Equipments, named in the **SCC**, shall attain the rating and performance requirements specified inthe Contract, subject to and upon the conditions therein specified.

24.2 If the guarantees specified in the Contract are not established, then the Employer shall, at the Employer's discretion either

(a) reject the equipment, or

(b) accept the equipment after assessing liquidated damages in accordance with the provision in the **SCC** against the Contractor and such amounts shall be deducted from the Contract Price or otherwise recovered from the Contractor.

24.3 In case the Employer exercises its option to reject the equipment, the Contractor shall at its cost and expense make such changes, modifications and/or additions to the equipment or any part thereof as may be necessary to meet the specified guarantees. The Contractor shall notify the Employer upon completion of the necessary changes, modifications and/or additions, and shall request the Employer to repeat the Test until the level of the specified guarantee has been met.

24.4 Whenever the Employer exercises its option to accept the equipment after levy of liquidated damages, the payment of liquidated damages under GCC Sub-Clause 24.2, upto the limitation of liability specified in the **SCC**, shall completely satisfy the Contractor's guarantees under GCC Sub-Clause 24.2, and the Contractor shall have no further liability whatsoever to the Employer in respect thereof.

25. Patent Indemnity

25.1 The Contractor shall, subject to the Employer's compliance with GCC Sub-Clause 25.2, indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Employer may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract by reason of: (a) the installation of the Facilities by the Contractor or the use of the Facilities in the country where the Site is located; and (b) the sale of the products produced by the Facilities in any country.

Such indemnity shall not cover any use of the Facilities or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract, any infringement resulting from the use of the Facilities or any part thereof, or any products produced thereby in association or combination with any other equipment, plant or materials not supplied by the Contractor, pursuant to the Contract Agreement.

25.2 If any proceedings are brought or any claim is made against the Employer arising out of the matters referred to in GCC Sub-Clause 25.1, the Employer shall promptly give the Contractor a notice thereof, and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Contractor fails to notify the Employer within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the twenty-eight (28) day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim.

The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

25.3 The Employer shall indemnify and hold harmless the Contractor and its employees, officers and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Contractor may suffer as a

result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Employer.

26. Limitation of Liability

26.1 Except in cases of gross negligence or willful misconduct,

(a) the Contractor and the Employer shall not be liable to the other party for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Employer and

(b) the aggregate liability of the Contractor to the Employer, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Contractor to indemnify the Employer with respect to patent infringement.

G. Risk Distribution

27. Transfer of Ownership

27.1 Ownership of the Plant and Equipment (including spare parts) to be imported into India shall be transferred to the Employer upon loading on to the mode of transport to be used to convey the Plant and Equipment from the country of origin to that country and upon endorsement of the dispatch documents in favour of the Employer.

27.2 Ownership of the Plant and Equipment (including spare parts) procured in India, shall be transferred to the Employer upon loading on to the mode of transport to be used to carry the Plant and Equipment from the works to the site and upon endorsement of the despatch documents in favour of the Employer.

27.3 Ownership of the Contractor's Equipment used by the Contractor and its Subcontractors in connection with the Contract shall remain with the Contractor or its Subcontractors.

27.4 Ownership of any Plant and Equipment in excess of the requirements for the Facilities shall revert to the Contractor upon Completion of the Facilities or at such earlier time

when the Employer and the Contractor agree that the Plant and Equipment in question are no longer required for the Facilities provided quantity of any Plant and Equipment specifically stipulated in the Contract shall be the property of the Employer whether or not incorporated in the Facilities.

27.5 Notwithstanding the transfer of ownership of the Plant and Equipment, the responsibility for care and custody thereof together with the risk of loss or damage thereto shall remain with the Contractor pursuant to GCC Clause 28 (Care of Facilities) hereof until Completion of the Facilities and Taking Over pursuant to GCC Clause 20or the part thereof, if any, as per GCC Sub-Clause 1.1(e) in which such Plant and Equipment are incorporated.

28. Care of Facilities

28.1 The Contractor shall be responsible for the care and custody of the Facilities or any part thereof until the date of Taking Over Certificate pursuant to GCC Clause 20 or, where the Contract provides for Completion of the Facilities in parts, until the date of Completion of the relevant part, and shall make good at its own cost any loss or damage that may occur to the Facilities or the relevant part thereof from any cause whatsoever during such period. The Contractor shall also be responsible for any loss or damage to the Facilities caused by the Contractor or its Subcontractors in the course of any work carried out, pursuant to GCC Clause 22. Notwithstanding the foregoing, the Contractor shall not be liable for any loss or damage to the Facilities or that part thereof caused by any use or occupation by the Employer or any third party (other than a Subcontractor) authorized by the Employer of any part of the Facilities.

29. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification

29.1 The Contractor shall indemnify and hold harmless the Employer and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property (other than the Facilities whether accepted or not), arising in connection with the supply and installation of the Facilities and by reason of the negligence of the Contractor or its Subcontractors, or their employees, officers or agents, except any injury, death or property damage caused by the negligence of the Employer, its contractors, employees, officers or agents.

29.2 If any proceedings are brought or any claim is made against the Employer that might subject the Contractor to liability under GCC Sub-Clause 29.1, the Employer shall promptly give the Contractor a notice thereof and the Contractor may at its own expense and in the Employer's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Contractor fails to notify the Employer within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Employer shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Employer within the twenty-eight (28) day period, the Employer shall make no admission that may be prejudicial to the defense of any such proceedings or claim.

The Employer shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

29.3 Notwithstanding anything in this Contract to the contrary, it is agreed that neither the Contractor nor the Employer shall be liable to the other party for loss of production, loss of profit, loss of use or any other indirect or consequential damages.

30. Insurance

30.1 The Contractor shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurances set forth below in the sums and with the deductibles and other conditions. The identity of the insurers and the form of the policies shall be subject to the approval of the Employer, who should not unreasonably withhold such approval.

(a) Marine Cargo Policy/Transit Insurance Policy:

(I)(i) Marine Cargo policy for imported equipment

The Contractor shall take the Marine Cargo Policy for Plant and Equipment including Mandatory Spares to be supplied from abroad wherein export/import including inland transit is involved for the movement of the Plant and Equipment including mandatory Spares. The policy shall cover movement of Plant and Equipment including mandatory Spares from the manufacturer's works to the project's warehouse at final destination site. The policy shall cover all risk for loss or damage that may occur during

transit of Plant and Equipment including mandatory Spares from the Contractor/sub-Contractor's works or stores until arrival at project's warehouse/ store at final destination. Institute Cargo Clause (ICC) 'A' along with war & Strike Riots & Civil Commotion (SRCC) cover shall be taken.

(I)(ii) Transit Insurance Policy for indigenous equipment

Similarly, Transit Insurance Policy shall be taken wherein only inland transit is involved for the movement of Plant and Equipment including mandatory Spares supplied from within India. The policy shall cover movement of Plant and Equipment including mandatory Spares from the manufacturer's works to the project's warehouse at final destination site. Inland Transit Clause(ITC) 'A' along with war & Strike Riots & Civil Commotion (SRCC) extension cover shall be taken.

(II) If during the execution of Contract, the Employer requests the Contractor to take any other add-on cover(s)/ supplementary cover(s) in aforesaid insurance, in such a case, the Contractor shall promptly take such add-on cover(s)/ supplementary cover(s) and the charges towards such premium for such add-on cover(s)/ supplementary cover(s) shall be reimbursed to the Contractor on submission documentary evidence of payment to the Insurance company.Therefore, charges towards premium for such add-on cover(s)/ supplementary cover(s) are not included in the Contract Price.

(III) The Contractor shall take the policy in the joint names of Employer and the Contractor. The policy shall indicate the Employer as the beneficiary. However, if the Contractor is having an open policy for its line of business, it should obtain an endorsement of the open cover policy from the insurance company indicating that the dispatches against this Contract are duly covered under its open policy and include the name of the Employer as jointly Insured in the endorsements to the open policy.

(b) Erection All Risk Policy/Contractor All Risk Policy:

(I) The policy should cover all physical loss or damage to the facility at site during storage, erection and commissioning covering all the perils as

provided in the policy as a basic cover and the add on covers as mentioned at Sl. No. (III) below.

(II) The Contractor shall take the policy in the joint name of Employer and the Contractor. All these policies shall indicate Employer as the beneficiary. The policy shall be kept valid till the date of the Operational Acceptance of the project and the period of the coverage shall be determined with the approval of the Employer.

If the work is completed earlier than the period of policy considered, the Contractor shall obtain the refund as per provisions of the policy and pass on the benefit to Employer. In case no refund is payable by the insurance company then the certificate to that effect shall be submitted to Employer at the completion of the project.

(III) The following add-on covers shall also be taken by the Contractor:

i) Earthquake

ii) Terrorism

iii) Escalation cost (approximately @10% of sum insured on annual basis)

iv) Extended Maintenance cover for Defect Liability Period

v) Design Defect

vi) Other add-on covers viz., 50-50 clause, 72 hours clause, loss minimization clause, waiver of subrogation clause (for projects of more than 100 crores, cover for offsite storage/fabrication (over 100 crores).

(IV) Third Party Liability cover with cross Liability within Geographical limits of India as on ADD-on cover to the basic EAR cover:

The third party liability add-on cover shall cover bodily injury or death suffered by third parties (including the Employer's personnel) and loss of or damage to property (including the Employer's property and any parts of

the Facilities which have been accepted by the Employer) occurring in connection with supply and installation of the Facilities.

(V) As per para 30.8 below, the cost of insurance premium is to be reimbursed to the Contractor for Owner Supplied Materials (OSM) for which the insurer is to be finalized by the Contractor as detailed therein. Alternatively, the Contractor may take a single policy covering the entire cost of the project including the cost of OSM. For this purpose, the Contractor shall submit documentary evidence for the premium paid for the entire project to the Employer and Employer shall reimburse to the Contractor the proportion of premium equal to value of OSM to total sum insured.

(VI) If during the execution of Contract, the Employer requests the Contractor to take any other add-on cover(s)/ supplementary cover(s) in aforesaid insurance, in such a case, the Contractor shall promptly take such add-on cover(s)/ supplementary cover(s) and the charges towards such premium for such add-on cover(s)/ supplementary cover(s) shall be reimbursed to the Contractor on submission documentary evidence of payment to the Insurance company. Therefore, charges towards premium for such add-on cover(s)/ supplementary cover(s) are not included in the Contract Price.

(c) Automobile Liability Insurance

The Contractor shall ensure that all the vehicles deployed by the Contractor or its Subcontractors (whether or not owned by them) in connection with the supply and installation of the Facilities in the project are duly insured as per RTA act. Further the Contractor or its Subcontractors may also take comprehensive policy (own damage plus third party liability) of each individual vehicles deployed in the project on their own discretion in their own name to protect their own interest.

(d) Workmen Compensation Policy:

(I) Workmen Compensation Policy shall be taken by the Contractor in accordance with the statutory requirement applicable in India. The Contractor shall ensure that all the workmen employed by the Contractor or its Subcontractors for the project are adequately covered under the policy.

(II) The policy may either be project specific covering all men of the Contractor and its Subcontractors. The policy shall be kept valid till the date of Operational Acceptance of the project.

Alternatively, if the Contractor has an existing 'Workmen Compensation Policy' for all its employees including that of the Subcontractor(s), the Contractor must include the interest of the Employer for this specific Project in its existing 'Workmen Compensation Policy'.

(III) Without relieving the Contractor of its obligations and responsibilities under this Contract, before commencing work the Contractor shall insure against liability for death of or injury to persons employed by the Contractor including liability by statute and at common law. The insurance cover shall be maintained until all work including remedial work is completed including the Defect Liability Period. The insurance shall be extended to indemnify the Principal for the Principal's statutory liability to persons employed by the Contractor.

The Contractor shall also ensure that each of its Subcontractors shall effect and maintain insurance on the same basis as the 'Workmen Compensation Policy' effected by the Contractor.

(e) Contractor's Plant and Machinery (CPM) Insurance

The Employer (including without limitation any consultant, servant, agent or employee of the Employer) shall not in any circumstances be liable to the Contractor for any loss of or damage to any of the Contractor's Equipment or for any losses, liabilities, costs, claims, actions or demands which the Contractor may incur or which may be made against it as a result of or in connection with any such loss or damage.

30.2 The Employer shall be named as co-insured under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 30.1, except for the Third Party Liability, Workmen Compensation Policy Insurances, and the Contractor's Subcontractors shall be named as co-insureds under all insurance policies taken out by the Contractor pursuant to GCC Sub-Clause 30.1 except for the Cargo Insurance During Transport, Workmen

Compensation Policy Insurances. All insurer's rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies.

30.3 The Contractor shall deliver to the Employer certificates of insurance (or copies of the insurance policies) as evidence that the required policies are in full force and effect. The certificates shall provide that no less than twenty-one (21) days' notice shall be given to the Employer by insurers prior to cancellation or material modification of a policy.

30.4 The Contractor shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless such Subcontractors are covered by the policies taken out by the Contractor.

30.5 The Employer shall at its expense take out and maintain in effect during the performance of the Contract in the sums and with the deductibles and other conditions specified. The Contractor and the Contractor's Subcontractors shall be named as co-insureds under all such policies. All insurers' rights of subrogation against such co-insureds for losses or claims arising out of the performance of the Contract shall be waived under such policies. The Employer shall deliver to the Contractor satisfactory evidence that the required insurances are in full force and effect. The policies shall provide that not less than twenty-one (21) days' notice shall be given to the Contractor by all insurers prior to any cancellation or material modification of the policies. If so requested by the Contractor, the Employer shall provide copies of the policies taken out by the Employer under this GCC Sub-Clause 30.5.

30.6 If the Contractor fails to take out and/or maintain in effect the insurances referred to in GCC Sub-Clause 30.1, the Employer may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Contractor under the Contract any premium that the Employer shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Contractor. If the Employer fails to take out and/or maintain in effect the insurances referred to in GCC 30.5, the Contractor may take out and maintain in effect any such insurances and may from time to time deduct from any amount due the Employer under the Contract any premium that the Contractor shall have paid to the insurer, or may otherwise recover such amount as a debt due from the Employer.

30.7 Unless otherwise provided in the Contract, the Contractor shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GCC Clause 30, and the monies payable by any insurers under all the insurance except Third Party Liability Insurance and Workmen Compensation Policy, shall be paid to the joint account of the Employer and the Contractor as mutually agreed and such amounts paid shall be apportioned between the Employer and the Contractor in accordance with the respective responsibilities under the Contract. The Employer shall give to the Contractor all such reasonable assistance as may be required by the Contractor. With respect to insurance claims in which the Employer's interest is involved, the Contractor shall not give any release or make any compromise with the insurer without the prior written consent of the Employer. With respect to insurance claims in which the Contractor's interest is involved, the Employer shall not give any release or make any compromise with the insurer without the prior written consent of the Contractor.

30.8 Further all equipment and materials being supplied by Employer for the erection (as per Technical Specification) shall be kept insured by the Contractor against any loss, damage, pilferage, theft, fire, etc. from the point of unloading up to the time of taking over by Employer including handling, transportation, storage, erection, testing and commissioning etc. The premium paid to the Insurance company by the Contractor for such insurance shall be reimbursed by Employer to the Contractor. The Contractor shall obtain competitive quotation for such insurance and shall take prior approval from Employer before taking the insurance. The insurable value of the equipment being supplied by Employer shall be intimated to the Contractor for arranging the insurance.

30.9 It will be the responsibility of the Contractor to lodge, pursue and settle all claims with the insurance company in case of any damage, loss, theft, pilferage or fire during execution of Contract and Employer shall be kept informed about it. The Contractor shall replace the lost/damaged materials promptly irrespective of the settlement of the claims by the underwriters and ensure that the work progress is as per agreed schedules. The losses, if any, in such replacement will have to be borne by the Contractor.

31. Change in Laws and Regulations

31.1 If, after the date seven (07) days prior to the date of Bid Opening, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed in India (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and

expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the performance of any of its obligations under the Contract. However, these adjustments would be restricted to direct transactions between the Employer and the Contractor and not on procurement of raw materials, intermediary components etc. by the Contractor for which the Employer shall be the sole judge. Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable.

32. Force Majeure

32.1 "Force Majeure" shall mean any event beyond the reasonable control of the Employer or of the Contractor, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected, and shall include, without limitation, the following:

(a) war, hostilities or warlike operations (whether war be declared or not), invasion, act of foreign enemy and civil war,

(b) rebellion, revolution, insurrection, mutiny, usurpation of government, conspiracy, riot and civil commotion,

(c) earthquake, landslide, volcanic activity, flood or cyclone, or other inclement weather condition, nuclear and pressure waves or other natural or physical disaster,

32.2 Neither party shall be considered to be in default or in breach of his obligations under the Contract to the extent that performance of such obligation is prevented by any circumstances of Force majure, which arises after date of Notification of Award.

32.3 If either party is prevented, hindered or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances thereof within fourteen (14) days after the occurrence of such event.

32.4 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of

Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The Time for Completion shall be extended in accordance with GCC Clause 34.

H. Change in Contract Elements

33. Change in the Facilities

33.1 Introducing a Change

33.1.1 Subject to GCC Sub-Clause 33.2.5, the Employer shall have the right to propose, and subsequently require, that the Project Manager order the Contractor from time to time during the performance of the Contract to make any change, modification, addition or deletion to, in or from the Facilities (hereinafter called "Change"), provided that such Change falls within the general scope of the Facilities and does not constitute unrelated work and that it is technically practicable, taking into account both the state of advancement of the Facilities and the technical compatibility of the Change envisaged with the nature of the Facilities as specified in the Contract.

33.1.2 The Contractor may from time to time during its performance of the Contract propose to the Employer (with a copy to the Project Manager) any Change that the Contractor considers necessary or desirable to improve the quality, efficiency or safety of the Facilities. The Employer may at its discretion approve or reject any Change proposed by the Contractor, provided that the Employer shall approve any Change proposed by the Contractor to ensure the safety of the Facilities.

33.1.3 Changes made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be not be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Completion.

33.1.4 The procedure on how to proceed with and execute Changes is specified in GCC Sub-Clauses 33.2 and 33.3.

33.2 Changes Originating from Employer

33.2.1 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If such rates and prices are inequitable, the parties thereto shall agree on specific rates for the valuation of the Change.

33.2.2 The Contract Price for (i) the items for which quantities have been indicated as lumpsum or lot or set and/or (ii) where the quantities are to be estimated by the Contractor shall remain constant unless there is change made in the Scope of Work by Employer. The quantities and unit prices (i) subsequently arrived while approving the Bill of Quantities (BOQ)/Billing breakup of lumpsum quantities/lot/Set and/or (ii) estimated by the Contractor shall be for on account payment purpose only. In case additional quantities, over and above the quantities in BOQ/billing breakup and /or estimated by the Contractor, are required for successful completion of the scope of work as per Technical Specification, the Contractor shall execute additional quantities of these items for which no additional payment shall be made over and above the lumpsum Contract Price. In case quantities of these items supplied at site are in excess of that required for successful completion of scope of work, such additional quantities shall be the property of the Contractor and they shall be allowed to take back the same from the site for which no deduction from the lumpsum Contract Price shall be made. Further, in case actual requirement of quantities for successful completion of scope of work is less than the quantities identified in the approved BOQ /billing breakup and/or estimated by the Contractor, the lumpsum contract price shall remain unchanged and no deduction shall be made from the lumpsum price due to such reduction of quantities.

It shall be the responsibility of the Contractor to pay all statutory taxes, duties and levies to the concerned authorities for such surplus material which would otherwise have been, lawfully payable in case of non-deemed export contracts. The Contractor shall submit an indemnity bond to keep Employer harmless from any liability, before release of such material to the Contractor by Employer.

Set/Lot/Lumpsum shall be governed as per the requirement of the corresponding item description read in conjunction with relevant provisions of Technical Specifications and the Billing breakup referred to above shall be issued by the Employer based on Contractor's request, if and as may be required during the currency of the Contract.

33.2.3 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate effect of compliance therewith and with all other Change Orders that have already become binding upon the Contractor under this GCC Clause 33 would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement by more than the percentage

specified in **SCC**, the Employer and the Contractor shall mutually agree on specific rates for valuation of the Change beyond the specified percentage.

33.2.4 If rates and prices of any change are not available in the Contract, the parties thereto shall agree on specific rates for the valuation of the change and all matters therein related to the change. Based on the same, the Employer shall, if it intends to proceed with the Change, issue the Contractor with a Change Order.

33.2.5 The Employer shall issue the Contractor with a Change Order pursuant to GCC Sub-Clause 33.2 by way of amendment to the Contract or in any other manner deemed appropriate. Even if the Employer and the Contractor cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Completion, or any other matters related to the Change Proposal, the Employer may nevertheless instruct the Contractor to proceed with the Change by issue of a "Pending Agreement Change Order" ("Pending Agreement Amendment").

Upon receipt of a Pending Agreement Change Order, the Contractor shall immediately proceed with effecting the Changes covered by such Order. The parties shall thereafter attempt to reach agreement on the outstanding issues under the Change Proposal.

If the parties cannot reach agreement within sixty (60) days from the date of issue of the Pending Agreement Change Order, then the matter may be referred to the Arbitrator in accordance with the provisions of GCC Clause 38 & 39.

33.3 Changes Originating from Contractor

33.3.1 If the Contractor proposes a Change pursuant to GCC Sub-Clause 33.1.2, the Contractor shall submit to the Project Manager a written "Request for Change Proposal", giving reasons for the proposed Change and which shall include the following:

(a) brief description of the Change

(b) effect on the Time for Completion

(c) estimated cost of the Change

(d) effect on Functional Guarantees (if any)

(e) effect on any other provisions of the Contract.

Upon receipt of the Request for Change Proposal, the parties shall follow the procedures outlined in GCC Sub-Clauses 33.2.1 and 33.2.5. However, should the Employer choose not to proceed, the Contractor shall not be entitled to recover the costs of preparing the Request for Change Proposal.

34. Extension of Time for Completion

34.1 The Time(s) for Completion specified in the SCC shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

(a) any Change in the Facilities as provided in GCC Clause 33

(b) any occurrence of Force Majeure as provided in GCC Clause 32

(c) any suspension order given by the Employer under GCC Clause 35 hereof or reduction in the rate of progress pursuant to GCC Sub-Clause 35.2 or

(d) any changes in laws and regulations as provided in GCC Clause 31 or

(e) any other matter specifically mentioned in the Contract

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

34.2 Except where otherwise specifically provided in the Contract, the Contractor shall submit to the Project Manager a notice of a claim for an extension of the Time for Completion, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Employer and the Contractor shall agree upon the period of such extension. In the event that the Contractor does not accept the Employer's estimate of a fair and reasonable time extension, the Contractor shall be entitled to refer the matter to Arbitration, pursuant to GCC Sub-Clause 39.

34.3 The Contractor shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

35. Suspension

35.1 The Employer may request the Project Manager, by notice to the Contractor, to order the Contractor to suspend performance of any or all of its obligations under the Contract. Such notice shall specify the obligation of which performance is to be suspended, the effective date of the suspension and the reasons therefor. The Contractor shall thereupon suspend performance of such obligation (except those obligations necessary for the care or preservation of the Facilities) until ordered in writing to resume such performance by the Project Manager.

If, by virtue of a suspension order given by the Project Manager, other than by reason of the Contractor's default or breach of the Contract, the Contractor's performance of any of its obligations is suspended for an aggregate period of more than ninety (90) days, then at any time thereafter and provided that at that time such performance is still suspended, the Contractor may give a notice to the Project Manager requiring that the Employer shall, within twenty-eight (28) days of receipt of the notice, order the resumption of such performance or request and subsequently order a change in accordance with GCC Clause 33, excluding the performance of the suspended obligations from the Contract.

If the Employer fails to do so within such period, the Contractor may, by a further notice to the Project Manager, elect to treat the suspension, where it affects a part only of the Facilities, as a deletion of such part in accordance with GCC Clause 33 or, where it affects the whole of the Facilities, as termination of the Contract under GCC Sub-Clause 36.1.

35.2 If the Contractor's performance of its obligations is suspended or the rate of progress is reduced pursuant to this GCC Clause 35, then the Time for Completion shall be extended in accordance with GCC Sub-Clause 34.1, and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction shall be paid by the Employer to the Contractor in addition to the Contract Price, except in the case of suspension order or reduction in the rate of progress by reason of the Contractor's default or breach of the Contract.

35.3 During the period of suspension, the Contractor shall not remove from the Site any Plant and Equipment, any part of the Facilities or any Contractor's Equipment, without the prior written consent of the Employer.

36. Termination

36.1 Termination for Employer's Convenience

36.1.1 The Employer may at any time terminate the Contract for any reason by giving the Contractor a notice of termination that refers to this GCC Sub-Clause 36.1.

36.1.2 Upon receipt of the notice of termination under GCC Sub-Clause 36.1.1, the Contractor shall either immediately or upon the date specified in the notice of termination

(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) (ii) below

(c) remove all Contractor's Equipment from the Site, repatriate the Contractor's and its Subcontractors' personnel from the Site, remove from the Site any wreckage, rubbish and debris of any kind, and leave the whole of the Site in a clean and safe condition

(d) In addition, the Contractor, subject to the payment specified in GCC Sub-Clause 36.1.3, shall

(i) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination

(ii) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant and Equipment as of the date of termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors

(iii) deliver to the Employer all non-proprietary drawings, specifications and other documents prepared by the Contractor or its Subcontractors as at the date of termination in connection with the Facilities.

36.1.3 In the event of termination of the Contract under GCC Sub-Clause 36.1.1, the Employer shall pay to the Contractor the following amounts:

(a) the Contract Price, properly attributable to the parts of the Facilities executed by the Contractor as of the date of termination

(b) the costs reasonably incurred by the Contractor in the removal of the Contractor's Equipment from the Site and in the repatriation of the Contractor's and its Subcontractors' personnel

(c) any amounts to be paid by the Contractor to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges

(d) costs incurred by the Contractor in protecting the Facilities and leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 36.1.2

(e) the cost of satisfying all other obligations, commitments and claims that the Contractor may in good faith have undertaken with third parties in connection with the Contract and that are not covered by paragraphs (a) through (d) above.

36.2 Termination for Contractor's Default

36.2.1 The Employer, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefor to the Contractor, referring to this GCC Sub-Clause 36.2:

(a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt

(b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of GCC Clause 37.

(c) if the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this Sub-Clause:

"corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

"fraudulent practice" is any act or omission, including a misrepresentation, that knowingly or recklessly misleads or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

"collusive practice" is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

"coercive practice" is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

"obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Employer's investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation;

or

(bb) acts intended to materially impede the exercise of the Employer's inspection and audit rights.

In persuasions of its policy, the Employer will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, a contract.

36.2.2 If the Contractor

(a) has abandoned or repudiated the Contract

(b) has without valid reason failed to commence work on the Facilities promptly or has suspended (other than pursuant to GCC Sub-Clause 35.2) the progress of Contract performance for more than twenty-eight (28) days after receiving a written instruction from the Employer to proceed

(c) persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause

(d) refuses or is unable to provide sufficient materials, services or labor to execute and complete the Facilities in the manner specified in the program furnished under GCC Sub-Clause 14.2 at rates of progress that give reasonable assurance to the Employer that the Contractor can attain Completion of the Facilities by the Time for Completion as extended,

then the Employer may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Employer may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this GCC Sub-Clause 36.2.

36.2.3 Upon receipt of the notice of termination under GCC Sub-Clauses 36.2.1 or 36.2.2, the Contractor shall, either immediately or upon such date as is specified in the notice of termination,

(a) cease all further work, except for such work as the Employer may specify in the notice of termination for the sole purpose of protecting that part of the Facilities already executed, or any work required to leave the Site in a clean and safe condition

(b) terminate all subcontracts, except those to be assigned to the Employer pursuant to paragraph (d) below

(c) deliver to the Employer the parts of the Facilities executed by the Contractor up to the date of termination

(d) to the extent legally possible, assign to the Employer all right, title and benefit of the Contractor to the Facilities and to the Plant and Equipment as of the date of

termination, and, as may be required by the Employer, in any subcontracts concluded between the Contractor and its Subcontractors

(e) deliver to the Employer all drawings, specifications and other documents prepared by the Contractor or its Subcontractors as of the date of termination in connection with the Facilities.

36.2.4 The Employer may enter upon the Site, expel the Contractor, and complete the Facilities itself or by employing any third party. The Employer may, to the exclusion of any right of the Contractor over the same, take over and use with the payment of a fair rental rate to the Contractor, with all the maintenance costs to the account of the Employer and with an indemnification by the Employer for all liability including damage or injury to persons arising out of the Employer's use of such equipment, any Contractor's Equipment owned by the Contractor and on the Site in connection with the Facilities for such reasonable period as the Employer considers expedient for the supply and installation of the Facilities.

Upon completion of the Facilities or at such earlier date as the Employer thinks appropriate, the Employer shall give notice to the Contractor that such Contractor's Equipment will be returned to the Contractor at or near the Site and shall return such Contractor's Equipment to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the same from the Site.

36.2.5 Subject to GCC Sub-Clause 36.2.6, the Contractor shall be entitled to be paid the Contract Price attributable to the Facilities executed as of the date of termination, the value of any unused or partially used Plant and Equipment on the Site, and the costs, if any, incurred in protecting the Facilities and in leaving the Site in a clean and safe condition pursuant to paragraph (a) of GCC Sub-Clause 36.2.3. Any sums due to the Employer from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

36.2.6 If the Employer completes the Facilities, the cost of completing the Facilities by the Employer shall be determined.

If the sum that the Contractor is entitled to be paid, pursuant to GCC Sub-Clause 36.2.5, plus the reasonable costs incurred by the Employer in completing the Facilities, exceeds the Contract Price or the entire Facilities if entire Facilities have been completed or the

price for part of the Facilities if part of the Facilities have been completed, the Contractor shall be liable for such excess.

If such excess is greater than the sums due the Contractor under GCC Sub-Clause 36.2.5, the Contractor shall pay the balance to the Employer, and if such excess is less than the sums due the Contractor under GCC Sub-Clause 36.2.5, the Employer shall pay the balance to the Contractor. For facilitating such payment the Employer shall encash the Bank Guarantees of the Contractor available with the Employer and retain such other payments due to the Contractor under the Contract in question or any other Contract that the Employer may have with the Contractor.

The Employer and the Contractor shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

36.3 In this GCC Clause 36, the expression "Facilities executed" shall include all work executed, Installation Services provided, and all Plant and Equipment acquired (or subject to a legally binding obligation to purchase) by the Contractor and used or intended to be used for the purpose of the Facilities, up to and including the date of termination.

37. Assignment

37.1 Neither the Employer nor the Contractor shall, without the express prior written consent of the other party (which consent shall not be unreasonably withheld), assign to any third party the Contract or any part thereof, or any right, benefit, obligation or interest therein or thereunder, except that the Contractor shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.

I. Resolution of Disputes

38. Settlement of Disputes

38.1 If any dispute of any kind whatsoever shall arise between the Employer and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the execution of the Facilities, whether during the progress of the Facilities or after their completion and whether before or after the termination,

abandonment or breach of the Contract, the parties shall seek to resolve any such dispute or difference, to the extent possible, amicably by mutual consultation.

38.2 If the parties fail to resolve such a dispute or difference by mutual consultation at the execution site level, then the dispute shall be referred by the Contractor to the Project Manager, who, within a period of thirty (30) days after being requested by Contractor to do so, shall give written notice of his decision.

38.2.1 The decision/instruction of the Project Manager shall be deemed to have been accepted by the Contractor unless notified by the Contractor of his intention to refer the matter for Arbitration within thirty (30) days of such decision/instruction.

38.2.2 In the event the Project Manager fails to notify his decision as aforesaid within thirty (30) days, the Contractor, if he intends to go for Arbitration, shall notify his intention to the Project Manager within 30 days of expiry of the first mentioned period of thirty days failing which it shall be deemed that there are no dispute or difference between the Employer and the Contractor.

38.3 In case of dispute or difference between the Employer and the Contractor, if the Employer intends to go for Arbitration, he shall notify such intention to the Contractor.

39. Arbitration

39.1 All disputes or differences in respect of which the decision, if any, of the Project Manager and/or the Head of the Implementing Authority has not become final or binding as aforesaid shall be settled by arbitration in the manner provided herein below:

39.2 The arbitration shall be conducted by three arbitrators, one each to be nominated by the Contractor and the Employer and the third to be appointed by both the arbitrators in accordance with the Indian Arbitration Act. If either of the parties fails to appoint its arbitrator within sixty (60) days after receipt of a notice from the other party invoking the Arbitration clause, the arbitrator appointed by the party invoking the arbitration clause shall become the sole arbitrator to conduct the arbitration.

39.3 The language of the arbitration proceedings and that of the documents and communications between the parties shall be English. The arbitration shall be conducted in accordance with the provisions of the Indian Arbitration and Conciliation Act, 1996 or any statutory modification thereof. The venue of arbitration shall be the state capital.

39.4 The decision of the majority of the arbitrators shall be final and binding upon the parties. In the event of any of the aforesaid arbitrators dying, neglecting, resigning or being unable to act for any reason, it will be lawful for the party concerned to nominate another arbitrator in place of the outgoing arbitrator.

39.5 During settlement of disputes and arbitration proceedings, both parties shall be obliged to carry out their respective obligations under the Contract.

40. **WBSEDCL Personnel for Liaison**:

40.1 Controlling Officer :- The Additional Chief Engineer, IT&C Cell.

40.2 Supervising Officer :- The Regional Manager ,Darjeeling Regional Office, WBSEDCL.

40.3 Nodal Officer :- The Superintending Engineer (E), IT&C Cell

40.4 Consignee Officer:- The Divisional Manger , Siliguri Town Division , WBSEDCL

40.5 Paying Authority :- The Manager (F&A), Corporate Establishment, WBSEDCL

Section-5

5 Special Conditions of Contract (SCC)

<table>
<tr><th>Sl. No.</th><th>GCC Clause Ref. No.</th><th>Amendment/Supplement to GCC</th></tr>
<tr><td>1.</td><td>GCC 1.1(o)</td><td>Supplementing Sub-Clause GCC 1.1(o)

The Employer is:</td></tr>
<tr><td>3.</td><td>GCC 1.1 (ee)</td><td>Supplementing Sub-Clause GCC 1.1(ee)

Time for Completion:
<table>
<tr><th>Sl. No.</th><th>Activities</th><th>Duration in months from the effective date of Contract</th></tr>
<tr><td>1.</td><td>Smart Grid Elements Implementation</td><td>18 months</td></tr>
</table>
.</td></tr>
<tr><td>4.</td><td>GCC 2.1</td><td>Addition of following new Sub-Clauses after GCC 2.1
GCC 2.1.1 The Contracts to be entered into with the successful Bidder shall be as under :
-First Contract: For Ex-Works supply of all equipment and materials (whether in India or abroad) including mandatory spares and Type Test to be conducted (whether in India or abroad) (Ex-Works Supply Contract)
- Second Contract: For providing all services i.e. port handling and custom</td></tr>
</table>

Sl. No.	GCC Clause Ref. No.	Amendment/Supplement to GCC
		clearance of imported goods and loading, inland transportation for delivery at site, insurance, unloading, storage, handling at site, installation, Testing and Commissioning including performance testing in respect of all the equipment supplied under the "First Contract", Training to be imparted (whether in India or abroad), Maintenance during and after Defect Liability Period and any other services specified in the Contract Documents (Services Contract). GCC 2.1.2 The award of /two separate contracts shall not in any way dilute the responsibility of the Contractor for the successful completion of the facilities as per Specification and a breach in one Contract shall automatically be construed as a breach of the other Contract(s) which will confer a right on the Employer to terminate the other Contract(s) also at the risk and the cost of the Contractor. GCC 2.1.5 The Contract will be signed in two originals and the Contractor shall be provided with one signed original and the rest will be retained by the Employer. GCC 2.1.6 The Contractor shall provide free of cost to the Employer all the engineering data, drawing and descriptive materials submitted with the bid, in at least two (2) copies to form a part of the Contract immediately after Notification of Award. GCC 2.1.7 Subsequent to signing of the Contract, the Contractor at his own cost shall provide the Employer with at least Ten (10) true copies of Contract Agreement within fifteen (15) days after signing of the Contract.
5.	GCC 3.3	Replacing Sub-Clause GCC 3.3 The supply of Mandatory Spares Parts, if any, shall be included in the Contract. Beside the aforesaid Mandatory Spares parts, the Contractor shall ensure the availability of spare parts required for the operation and maintenance of the Facilities by the Employer for a minimum period of seven (7) years from Operational Acceptance of the Facilities by the Employer. However, in the event of that a equipment/component is declared to be withdrawn from production, Contractor shall ensure the availability of spare parts for the supplied items for a

Sl. No.	GCC Clause Ref. No.	Amendment/Supplement to GCC
		minimum period of 2 years from the date of withdrawal from production or 7 years from Operational Acceptance of the Facilities by the Employer, whichever is greater, however, not exceeding overall period of 7 years from Operational Acceptance by the Employer. For balance of the period, if any, up to 7 years from Operational Acceptance by Employer, Contractor shall ensure that functionally equivalent hardware is available which is compatible with all software delivered with the system. If Employer chooses to purchase from the Contractor said functionally equivalent hardware, any software modifications necessary to maintain complete functional compatibility with all software delivered by Contractor shall be made at no cost to Employer. In the event, the modified software is not found compatible with functionally equivalent hardware, the contractor shall make suitable corrections to this modified software and install this corrected software at no cost to Employer. If so desired by the Employer, the Contractor shall submit the specifications, price and the terms and conditions relating to the supply thereof for such spares identified by the Employer with validity period of 6 months within 30 days of receipt of request from Employer for its consideration and placement of order.
6.	GCC 6.6	**Replacing Sub-Clause GCC 6.6** The Employer shall be responsible for the continued operation of the Facilities after Taking Over, in accordance with GCC Sub-Clause 20.1.5. However, the Contractor shall be responsible for Maintenance during Defect Liability Period and during AMC thereafter in accordance with provisions of Technical Specifications.
8.	GCC 9.3.1	**Replacing Sub-Clause GCC 9.3.1** The Contractor shall, within twenty-eight (28) days of the notification of award, provide a performance security for the due performance of the Contract in the amount equivalent to Ten percent (10%) of the Contract Price(including Maintenance charges during Defect Liability Period and AMC charges after Defect Liability Period), with a validity upto ninety (90) days beyond the AMC Period. The same shall be extended by the Contractor time to time till ninety (90)

Sl. No.	GCC Clause Ref. No.	Amendment/Supplement to GCC
		days beyond the actual AMC Period, as may be required under the Contract.
9.	GCC 9.4(c)	**Replacing Sub-Clause GCC 9.4(c)** GCC 9.4(c) by a foreign bank or a subsidiary of a foreign bank, acceptable to the Employer, with overall international corporate rating or rating of long term debt not less than A- (A minus) or equivalent by a reputed rating agency. Further, the Bank Guarantee should be confirmed by either its corresponding bank located in India or a Public Sector Bank located in India.
14.	GCC 20.2.1	Deleted as Guarantee Tests are not applicable
15.	GCC 20.2.2.1 (II)	Delete as Functional Guarantees are not applicable
16.	GCC 22.10	**Addition of new Sub-Clause after GCC 22.9** GCC 22.10.1**System Availability** The bidder shall guarantee that the system offered shall meet the availability requirement as specified in the Technical Specification commencing from the date of Taking Over/Completion of Facilities by the Employer/Owner. In case the actual availability falls short of the above said guaranteed availability under the conditions specified in Technical Specifications, Employer/Owner shall have rights and remedies specified in the said clause.
17	GCC 22.10	**Addition of new Sub-Clause after GCC 22.9** GCC 22.10.2 **Maintenance Period** In case the quarterly average availability for the system fall short of stipulated criteria of % , the Contractor shall be liable to the penalties as mention at section 5.8.9 of Section -5, Volume-II of the Technical Specification.
18.	GCC 23	Deleted as Functional Guarantees are not applicable
19.	GCC 24.1	**Supplementing Clause GCC 24.1**

Sl. No.	GCC Clause Ref. No.	Amendment/Supplement to GCC
		Bidder shall confirm the guaranteed performance or efficiency of the equipments in response to the Technical Specifications.
20.	GCC 33.2.3	**Supplementing Clause GCC 33.2.3** Percentage for the Change Proposal under this Clause shall be limited to **Thirty (30) percent of the Contract Price**.

Section-6

6 Sample Forms & Procedures

BID FORM FOR FIRST STAGE BID UNDER TWO STAGE BIDDING

Bid Proposal Ref. No.:..... Date:.....

Name of Package: Smart Grid Elements Implementation

(Specification No. _____)

To

_____

_____

_____

Gentlemen and Ladies,

1.0 Having examined the Bidding Documents, including Amendment Nos. (*Insert Numbers*) dated ....., the receipt of which is hereby acknowledged, we the undersigned, offer to design, manufacture, test, deliver, install and commission (including carrying out Trial Operation, Performance & Guarantee Test as per provision of Technical Specification) the Facilities under the above-named package in full conformity with the said Bidding Documents.

2.0 **ATTACHMENTS TO THE BID FORM**

In line with the requirement of the Bidding Documents, we enclose herewith the following Attachments to the Bid Form:

(a) Attachment 1A :- Cost of the Tender Document of INR 12,000 in the form of crossed Bank Demand Draft / Pay Order drawn in favour of "West Bengal State Electricity Distribution Company Limited" payable at Kolkata on any Scheduled Bank during Bid Submission as per time schedule mentioned.

(b) Attachment 1B: A power of attorney duly authorized by a Notary Public indicating that the person(s) signing the bid have the authority to sign the bid and thus that the bid is binding upon us.

(c) Attachment 2: The documentary evidence that we are eligible to bid in accordance with ITB Clause 2. Further, in terms of ITB Clause 2.9.3 (b) & (c) of BDS, the qualification data has been furnished as per your format enclosed with the bidding documents [Attachment – 2(QR)]. *Further the required deed of Joint Undertaking signed by us and our Collaborator has also been furnished as per your format.

* *Delete if not applicable*.

(d) Attachment 3: The documentary evidence establishing in accordance with ITB Clause 3, Vol.-I of the Bidding Documents that the facility offered by us are eligible facilities and conform to the Bidding Documents has been furnished as Attachment 3. Moreover, a list of Special Tools & Tackles to be furnished by us in case of award, is also enclosed as per your format as Attachment 3A.

(e) Attachment 4:The details of all major items of services or supply which we propose subletting in case of award, giving details of the name and nationality of the proposed subcontractor/sub-vendor for each item.

(f) Attachment 5: The variation and deviations from the requirements of the Conditions of Contract, Bid Data Sheet and other commercial conditions, Technical Specification and Drawings in your format enclosed with the Bidding Documents.

(g) Attachment 6: Answers to Questionnaire, as per technical specifications.

(h) Attachment 7: Work Completion Schedule.

(i) Attachment 8:Guarantee Declaration.

(j) Attachment 9: Information regarding ex-employees of "**Employer**" in our firm.

(k) Attachment 10:Information for E-payment, PF details and declaration regarding Micro/Small & Medium Enterprises

(l) Attachment 11:Additional Information

3.0 **SCHEDULES**

3.1 **Bill of Quantities (unpriced)**: In line with the requirements of the Bidding documents, we enclose herewith the unpriced Bill of Quantity indicating itemwise break-down for each constituent and the item description, quantity etc. duly filled-in as per the proformae given in Schedule-1, Section-I of Bid Form & Price Schedule, Volume-III of the Bidding Documents.

3.2 We are aware that the Price Schedules and the Bill of Quantities given in the Bidding Documents do not generally give a full description of the Work to be performed under each item and we shall be deemed to have read the Technical Specifications and other sections of the Bidding Documents and Drawings to ascertain the full scope of Work included in each item while filling-in the rates and prices in Second Stage (Price) Bid. We agree that the rates and prices to be quoted in Second Stage Bid shall be deemed to include and account for the full scope as aforesaid, including overheads and profit.

3.3 We declare that as specified in the ITB Clause 22.5, Volume-I of the Bidding Documents, prices to be quoted by us in the Price Schedules in Second Stage Bid shall be **on FIRM price basis** during the execution of Contract.

4.0 **TAXES AND DUTIES**

4.0 We confirm that except as otherwise specifically provided our Bid Prices in Second Stage Bid shall include all taxes, duties, levies and charges as may be assessed on us, our Sub-Contractor/Sub-Vendor or their employees by all municipal, state or national government authorities in connection with the Facilities, in and outside of India.

4.1 100% of applicable Taxes and Duties *(for direct transaction between Employer and us)*,which are payable by the Employer under the Contract, shall be reimbursed by the Employer after despatch of equipment on production of satisfactory documentary evidence by the Contractor in accordance with the provisions of the bidding documents.

4.2 We further understand that notwithstanding 4.0 above, in case of award on us, you shall also bear and pay/reimburse to us, Excise Duty, Sales Tax/VAT (but not the surcharge in lieu of Sales Tax/VAT),local tax and other levies in respect of direct transaction between you and us, imposed on the Plant & Equipment including Mandatory Spare Parts specified in Schedule No. 1 (**of Second stage bid**) to be incorporated into the Facilities; by the Indian Laws.

4.3 We also understand that, in case of award on us, you shall reimburse to us octroi/entry tax as applicable to destination site/state on all items of supply including bought-out finished items, which shall be dispatched directly from the sub-vendor's works to the Employer's site (sale-

in-transit). Further, Service Tax, if applicable, for the services to be rendered by us, the same is included in our bid price in Second Stage Bid.

4.4 We confirm that we shall also get registered with the concerned Sales Tax Authorities, in all the states where the project is located.

4.5 We confirm that no Sales Tax/VAT in any form shall be payable by you for the bought out items which shall be dispatched directly by us under the First Contract (as referred in para 5.1 below) to the project site. However, you will issue requisite Sales Tax declaration/Vatable forms in respect of such bought out items, on production of documentary evidence of registration with the concerned Sales Tax Authorities.

5.0 **CONSTRUCTION OF THE CONTRACT**

5.1 We declare that we have studied GCC Sub-Clause 2.1 relating to mode of contracting for Domestic Bidders and we are making this proposal with a stipulation that you shall award us two separate Contracts viz. 'First Contract' for ex-works supply of all equipment and materials including mandatory spares and 'Second Contract' for providing all the services i.e. inland transportation for delivery at site, unloading, storage, handling at site, installation, testing and commissioning including Trial Operation in respect of all the equipment supplied under the 'First Contract' and other services specified in the Contract Documents. We declare that the award of two contracts will not in any way dilute our responsibility for successful operation of plant/equipment and fulfillment of all obligations as per Bidding Documents and that both the Contracts will have a cross-fall breach clause i.e. a breach in one contract will automatically be classified as a breach of other contract which will confer on you the right to terminate the other Contract at our risk and cost.

6.0 We have read the provisions of following clauses and confirm that the specified stipulations of these clauses are acceptable to us:

(a)	ITB 24	Bid Security
(b)	GCC 2.14	Governing Law
(c)	GCC 8	Terms of Payment
(d)	GCC 9.3	Performance Security
(e)	GCC 10	Taxes and Duties
(f)	GCC 21.2	Completion Time Guarantee
(g)	GCC 22	Defect Liability
(h)	GCC 23	Functional Guarantee

(i)	GCC 25	Patent Indemnity
(j)	GCC 26	Limitation of Liability
(k)	GCC 38	Settlement of Disputes
(l)	GCC 39	Arbitration

7.0 We undertake, if our Second Stage Bid is accepted, to commence the work on Facilities immediately upon your Notification of Award to us, and to achieve Completion within the time stated in the Bidding Documents.

8.0 If our Second Stage Bid is accepted, we undertake to provide a Performance Security(ies) in the form and amounts, and within the times specified in the Bidding Documents.

9.0 We further undertake, if invited to do so by you and at our own cost, to attend a clarification meeting at a place of your choice for the purposes of reviewing our First Stage Bid and duly noting all amendments and additions thereof and noting omissions therefrom that you may require.

10.0 We further undertake, upon receiving your written invitation, to proceed with the preparation of our Second Stage Bid, updating our First Stage Bid in accordance with the requirements from the Memorandum of the clarification meeting and completing our commercial bid for performing the Facilities in accordance with our updated technical bid.

11.0 Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to contract execution, if we are awarded the contract, are listed below:

12.0

Name and address of agent	Amount and Currency	Purpose of Commission or gratuity
_____	_____	_____
_____	_____	_____
_____		
	_____	_____

(If none, state "none")

13.0 We, hereby, declare that only the persons or firms interested in this proposal as principals are named here and that no other persons or firms other than those mentioned herein have any interest in this proposal or in the Contract to be entered into, if the award is made on us, that this proposal is made without any connection with any other person, firm or party likewise submitting a proposal is in all respects for and in good faith, without collusion or fraud.

Dated this __ day of _____20___.

Thanking you, we remain,

Yours faithfully,

(Signature).....

(Printed Name).....

(Designation).....

(Common Seal).....

Date:

Place:

Business Address:

Country of Incorporation:

(State or Province to be indicated)

Name of the Principal Officer:

Address of the Principal Officer:

Note: Bidders may note that no prescribed proforma has been enclosed for:

(a) Attachment 1B: Power of Attorney.

(For Attachments 1B, Bidders may use their own proforma for furnishing the required information with the bid).

6.1 Attachment 2 – JV First Stage

Smart Grid Elements Implementation

(Joint Venture Agreement and Power of Attorney for Joint Venture*)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

The Joint Venture and Power of Attorney for Joint Venture are enclosed herewith.

* Applicable for Joint Venture.

Date:.....

(Signature).....……..

Place:.....

(Printed Name).....…….

(Designation).....…….....

(Common Seal)…….....

6.2 Attachment 3:

Smart Grid Elements Implementation

(List of Special Maintenance Tools & Tackles)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

We are furnishing below the list of special maintenance tools & tackles for various equipment under the subject package. In Second Stage (Price) Bid, the prices for these tools & tackles shall be included in our lumpsum bid price. We further confirm that the list of special maintenance tools & tackles includes all the items specifically identified in your bidding documents as brought out below:

S.No.	For Equipment	Item Description	Unit	Quantity

Notwithstanding what is stated above, we further confirm that any additional special maintenance tools and tackles, required for the equipment under this package shall be furnished by us at no extra cost to the employer.

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

6.3 Attachment 4:

Smart Grid Elements Implementation

(Bought-out & Sub-contracted Items)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

We hereby furnish the details of the items/ sub-assemblies, we propose to buy for the purpose of furnishing and installation of the subjectPackage:

Sl. No.	Item Description	Quantity proposed to be bought/sub-contracted	Details of the proposed sub-contractor/sub-vendor	
			Name	Nationality
1.				
2.				
3.				
4.				
5.				
6.				

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

6.4 Attachment 5:

Smart Grid Elements Implementation

(Deviations and Exceptions to the Provisions)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

We hereby enclose the list of variation and deviations from the requirements of the Conditions of Contract (Vol.-I), Technical Specifications (Vol.-II) for the subject package in the following format.

Sl. No.	Clause Reference No.	Provision as per the bidding document	Status as per technical specifications (alternative/ deviation or exception)	Detailed description of alternative/ deviation or exception	Reason for the change
Conditions of Contract, Vol.-I					

Technical Specifications, Vol.-II					

Date:.....

(Signature).....

Place:..... (Printed Name).....…

(Designation).....….....

(Common Seal).....……

6.5 Attachment 6:

Smart Grid Elements Implementation

(Answers to Questionnaire, as per technical specifications)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

With reference to the relevant Section(s) of Technical Specification, the answers to the Questionnaire(s) are provided below:

Sl. No.	Description of the Question	Answer

Date:.....

(Signature).....….

Place:.....

(Printed Name).....……

(Designation).....…….

(Common Seal)…….....……..

6.6 Attachment 7

Smart Grid Elements Implementation

(Work Completion Schedule)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

We hereby declare that the following Work Completion Schedule shall be followed by us in furnishing and installation of the subject Package i.e., Smart Grid Implementation for the period commencing from the effective date of Contract to us:

Sl. No.	Description Work	Period in months from the effective date of Contract
1.	Detailed Engineering and drawing submission a) commencement b) completion	
2.	Equipment Design and Specification a) commencement b) completion	
3.	Procurement of raw materials commencement b) completion	
4.	Type Tests commencement	

Sl. No.	Description Work	Period in months from the effective date of Contract
	b) completion	
5.	Manufacturing a) commencement b) completion	
6.	Factory Test a) commencement b) completion	
7.	Shipment & Delivery at site a) commencement b) completion	
8.	Establishment of Site Office commencement b) completion	
9.	Installation at Site a) commencement b) completion	
10.	Testing & Commissioning a) commencement b) completion	
11.	Trial Operation a) commencement	

Sl. No.	Description Work	Period in months from the effective date of Contract
	b) completion	

Date:..... (Signature).....….....

Place:..... (Printed Name)...….....…….

(Designation).....….....…….....

(Common Seal)…….…….....

Note: Bidders to enclose a detailed network covering all the activities to be undertaken for completion of the project indicating key dates for various milestones for each phase constituent-wise.

6.7 Attachment 8:

Smart Grid Elements Implementation

(Guarantee Declaration)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

We conform that the equipments offered shall have minimum performance specified in Technical Specification. We further guarantee the performance/efficiency of the equipments in response to the Technical Specifications.

Date:.....

(Signature).....…….....……..

Place:.....

(Printed Name).....……..

(Designation).....…….....

(Common Seal)…….....

6.8 Attachment 9:

Smart Grid Elements Implementation

(Information regarding Ex-employees of "Employer" in our Organisation)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

We hereby furnish the details of ex-employees of "Employer" who had retired/ resigned at the level of General Manager and above from the "Employer" and subsequently have been employed by us:

Sl. No.	Name of the person with designation in "Employer"	Date of Retirement/ resignation from "Employer"	Date of joining and designation in our Organisation
1.	.....	.....	.....
2.	.....	.....	.....
3.	.....	.....	.....
4.	.....	.....	.....

Date:.....

(Signature).....

Place:.....

(Printed Name).....

(Designation).....

(Common Seal).....

Note: The information in similar format should be furnished for each partner of joint venture in case of joint venture bid.

6.9 Attachment 10:

Smart Grid Elements Implementation

(Information for E – payment, PF details and declaration for Micro/Small and Medium Enterprise)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

We are furnishing the following details of Statutory Registration Numbers and details of Bank for electronic payment.

1.	Name of the Supplier/ Contractor in whose favour payment is to be made	
2.	Address with PIN Code and State	Registered Office: Branch Office: Correspondence Address:
3.	Status – Company/others [Declaration of Micro/ Small/ Medium Enterprise under Micro/ Small & Medium Enterprises Development Act 2006, if applicable]	
4.	Permanent Account (PAN) No.	
5.	Central Sales Tax (CST) No.	

6.	State Sales Tax No.	
7.	Work Contract Tax No.	
8.	Service Tax Registration No.	
9.	PF Registration No. of the Company	
10.	PF Regional Office covered (with Address)	
11.	Name of Contact Person	
12.	Telephone No(s). Email	Landline(s): Mobile(s): Email ID :
13.	Bank Details for Electronic Payment	Name of the Bank: Address of Branch: Account No.: Type of Account: [ ] Saving [ ] Current

14.	9 digit MICR code printed at bottom in middle, next to cheque no.	
15.	IFSC (for RTGS)/NEFT Code (*to be obtained from the Bank*) ***Sample Cancelled Cheque to be enclosed***	

We hereby declare that the above information are true and correct and we agree that the payment on account of this Contract, in the event of award, be made in the above account maintained in the above mentioned Bank.

Date:.....

(Signature).....…….....……..

Place:.....

(Printed Name).....……

(Designation).....…….....

(Common Seal)…….....

6.10 Attachment 11:

Smart Grid Elements Implementation

(Additional Information)

Bidder's Name and Address: To: < Employer Address >

Dear Sir,

In support of the additional information required as per ITB Sub-Clause 9.3 (o) of the Bidding Documents, we furnish herewith our data/details/documents etc., along with other information, as follows (the stipulations have been reproduced in italics for ready reference):

1.0 The Bidder shall furnish

A certificate from their Banker(s) (as per prescribed formats in Form 16, Section-VI: Sample Forms and Procedures) indicating various fund based/non fund based limits sanctioned to the Bidder and the extent of utilization as on date. Such certificate should have been issued not earlier than three months prior to the date of bid opening. Wherever necessary the Employer may make queries with the Bidders' Bankers.[Reference ITB clause 9.3(o)(i)]

1.1 In accordance with 1.0, certificate(s) from banker as per requisite format, indicating various fund based/non fund based limits sanctioned to the bidder and the extent of utilization as on date is/are enclosed, as per the following details:

Name of the Bidder	
Name of the Banker by whom certificate issued	
Date of certificate (should not be earlier than **3 months** prior to date of bid opening)	

Whether fund based/non fund based limits are indicated in the certificate	
Whether extent of utilization is indicated in the certificate	

1.2 The Bidder should accordingly also provide the following information/documents:

(i) Details of Banker:

Name of Banker	
Address of Banker	_____ _____ _____
Telephone No.	_____
Contact Name and Title	_____
Fax No.	_____
E-mail ID	_____

(ii) As per para 1.0, Authorization Letter(s) from the bidder addressed to the Banker(s), authorizing "Employer" to seek queries about the bidder with the Banker(s) and advising the Banker(s) to reply the same promptly, is/are enclosed as per following details:

Sl. No.	Letter Ref.	Date	Addressed to (name of the Bank)

2.0 **Litigation History**

The bidder should provide detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder may result in rejection of Bid. [Reference ITB clause 9.3(o)(ii)]

2.1 Details of litigation history resulting from Contracts completed or under execution by the bidder over the last five years

Year	Name of client, cause of litigation/arbitration and matter in dispute	Details of Contract and date	Award for or against the bidder	Disputed amount

3.0 **OTHER INFORMATION**

3.1 Current Contract Commitments of works in progress

3.2 Bidders should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Details of Contract	Value of outstanding work (in INR)	Estimated completion date

3.3 Form of Bank Guarantee for Contract Performance (to be submitted by the Bidder) for Annual Maintenance part of the Contract for 6 years after Defect Liability Period.

Section-7

Scope of Work

Please refer Vol.II of Technical Specifications Clause 1.5

Section-8

Guidelines for Technical Proposal

The proposal should cover all the aspects of this bid document. Any bid not found responsive to this bid document shall be rejected. Material deficiencies in providing the information requested may also result in rejection of the proposal. While preparing the technical proposal, bidders must give particular attention that the technical proposal does not include any financial information. The document being submitted shall be in accordance to ITB (section 2.0 of this document) and will be accordingly judged for the completeness of proposal.

8.1 Approach and Methodology

- Understanding of Employer System and impact of proposed solution with clear mention of the deliverables
- Details of proposed Implementation activities
- Project Team Structure and responsibility matrix
- Proposed Resources list, estimation and deployment planning
- Risk planning
- Detailed work plan with timelines

8.2 Project Experience

Bidder shall provide details of projects of similar nature with application modules and other subsystems (Field systems, network and communication equipments as well as central systems supplied) which have been successfully completed during the last 5 financial years. In case the system has already been replaced please do not include the project as part of description. The details of the same should include with supporting documents:

- Name of the Project
- Utility
- Date of Commissioning
- Total cost of the Project

- Indicate the functions implemented in the project
- Whether Integration performed with IT/any other system
- List type and quantity of field equipments supplied e.g.
    - FRTUs
    - Meters
    - DCUs
    - FPIs
    - RTUs
    - DCsetc
- Communication Media and protocols deployed e.g.
    - PLC
    - SDH
    - GPRS
    - RFMesh
    - Zigbee
    - IEC-61850
    - IEC 608705-5-104 or any other

8.3 Team details (CVs)

The following information shall be provided for the team leader of project implementation team.

- Name of Staff
- Position Assigned
- International or Domestic
- Firm
- Employment status with the firm (Full time/ Associate)
- Education (Degree, Year, Institution)

- Languages (Written, spoken, both)
- Number of years of experience
- Area of Expertise
- Role in the project

8.4 Firm Detail

Bidder shall provide details of net-worth and turnover for the past three audited financial years. Past history of litigation with Employer/utility if any shall be detailed separately. The experience of the firm in area similar to the proposed project shall be clearly outlined and supporting document e.g. LOA etc shall be enclosed.

8.5 Compliance checklist

< Part of Section-2: Information to Bidders (ITB)>

Section-9

Evaluation Methodology

Evaluation Criteria: Evaluation and Comparison of bids

(a)Technical Evaluation

The Evaluation Criteria for technical bids has been given at Appendix-I

(b) Determination of Technical Scores

The evaluation of bids will be graded according to the point scale.

Only first five Bidders in Technical Score will be asked to participate in 2nd stage Bid.

The technical Scores will also count for 2nd Stage bid evaluation. The weightage of technical score to commercial score will be 50-50%

$$F \times 1 \times \frac{\text{Highest Point}}{\text{Point scored by bidder}}$$

APPENDIX-I

EVALUATION CRITERIA FOR SELECTION OF SMART GRID IMPLEMENTING AGENCY

TABLE OF CONTENTS

1. Overall Experience (200Marks)
2. Direct Experience in Implementing Smart Grid Functionalities (100 Marks)
3. Solution and Approach Proposed by the Vendor (500 Marks)
4. Key Personnel (200 Marks)

Guidance Notes

Summary

This document details out the evaluation criteria proposed to be adopted for selection of Smart Grid Implementing Agency (SGIA). As far as possible, the document provides for an objective and quantitative evaluation along with guidance notes for evaluating various parameters.

The four key sub-sections that comprise the evaluation criteria ***(total of 1000 Marks)*** include:

1. **Overall experience of the Vendor (200 Marks)-** evaluates the overall experience of the vendor on various aspects such as IT aspects, SCADA/Communication, Utility Management, AMI/Smart Metering, Application Integration and Project Management, and Security.
2. **Direct Experience on Smart Grid Functionalities (100 Marks)** - evaluates direct experience of the vendor in implementing various smart grid functionalities nationally and internationally.
3. **Solution and Approach Proposed by the Vendor (500 Marks)**- evaluations the overall vendor response, the methodology and solution architecture proposed, additional functions proposed (other than the functionalities covered under the pilot), the work plan/program, plan for performance and quality assurance, plan for knowledge transfer and capacity building etc.
4. **Key Personnel Proposed (200 Marks)**- evaluates the strength of the team proposed for undertaking the assignment including the qualification, experience and time proposed on field.

Evaluation of Technical Proposals: The evaluation committee nominated by the Employer evaluates the technical proposals' responsiveness to the RfP, applying the evaluation criteria, as specified in the RfP. Each responsive proposal receives a technical score. A proposal is rejected at this stage if it does not meet the minimum marks for each section above *(50% of the total score for each sub-section)* or if it fails to achieve the minimum technical score of 500 marks.

Evaluation of Proposals: The successful bidder will be selected on Quality and Cost Basis (QCBS). Financial Bids of only those bidders shall be opened who score a minimum of 500 marks in the evaluation of Technical proposal/bid.

Financial Proposals will be evaluated following completion of the Technical Evaluation. Financial Proposals will receive pro-rated points based on the relationship of each financial proposal to that of the lowest evaluated price.

50% weightage will be given to scores obtained in the Technical Proposal and the remaining 50% to scores obtained in the evaluation of Financial Bid. The resultant sum of the scores shall decide the final rating of the bidder.

1. Overall Experience (200 Marks)

This maps out the key areas of expertise that the vendor must possess. The experience claimed in each case must be justified through submission of completion certificates indicating successful completion of the project from the Client. No marks shall be allotted for a cited credential if the requisite completion certificates are not submitted.

1.1. Experience in IT Solution Implementation (30 Marks)

10 marks for each assignment with a maximum of 30 marks of which at least one assignment should be in India

***Eligible Assignment**: Assistance to utilities *(Power / Gas / Water / Telecom Sectors) or Infrastructure (Rail / Road / Port / Airport) companies in providing IT consulting (Strategy, Advisory, Efficiency Improvements, Implementation, program management engagement. Also includes DPR assistance or procurement assistance or implementation or program management engagement for IT software / network / hardware solutions.*

1.2. SCADA/Communication (30 Marks)

10 marks for each assignment with a maximum of 30marks of which at least one assignment should be in India

***Eligible Assignment**: Experience in the design, engineering, supply, installation, testing and commissioning of SCADA & DMS (Supervisory Control and Data Acquisition System & Distribution Management System) Project for Power Distribution Systems (11KV or above).*

1.3. Utility Management (30 Marks)

10 marks for each assignment with a maximum of 30marks of which at least two assignments should be in India

***Eligible Assignment**: Experience in assisting national and international power utilities in the area of business process improvement, change management, utility process diagnostic (As-Is analysis), business process re-engineering of technical and commercial processes, process design and implementation, communication strategy, organizational structuring etc.*

1.4. AMI/Smart Metering (60 Marks)

20 marks for each assignment with a maximum of 60 marks

***Eligible Assignment**: Experience in the planning and execution of AMI projects which include installation and management of smart meters, DCU/ modems, last mile connectivity, head end system and MDMS.*

1.5. Applications Integration & Project Management (30 marks)

10 marks for each assignment with a maximum of 30 marks of which at least two assignments should be in India

***Eligible Assignment:** Experience in developing utility specific IT applications, developing enterprise wide detailed system requirement definition, development of solution architecture, integration design and developments, and interfaces with appropriate levels of security, managing large projects including subcontractors and selected vendors, supervision of vendor installations, configuration, coding and deliverables, and testing to ensure smooth integration with the legacy and new applications. It will also include monitoring project status, budget deviations, assessment of outcomes and communicating risks and adjustments on a timely basis.*

1.6. Security (20 Marks)

10 marks for each assignment with a maximum of 20marks

***Eligible Assignment**: Experience in planning and implementing high level security requirement through established methodologies and framework that ensure the security of the system against*

threats. The vendor must have delivered solutions that provide due consideration to data privacy, confidentiality and prescribed cyber security guidelines; and other aspects such as information flow enforcement through adequate authorizations, flagging of alerts, automated information labeling, isolated security functions, protection of sensitive data, encryption and decryption, cryptographic certification, threat modeling and security testing etc.

2. Direct Experience in Implementing Smart Grid Functionalities (100 Marks)

Utility may modify this based on the combination of smart grid functionalities considered in the pilot project. The detailed definition of various functionalities have been explained in the RfP.

(Marks to be allotted based on combination of functionalities considered in the pilot. For instance, if a pilot covers 4 functionalities, maximum 25 marks could be allotted to each functionality. Within each functionality the number of assignment that will lead to full 25 marks can be decided by the Utility)

Smart GridFunctionality	ScoringCriteria
AMI	
Outage Management System	
Power Quality	
PeakLoad Management (PLM)	
Micro Grid	
DecentralizedDistributedGeneration (DDG)	
RE Integration	
Visualization and Analytics	

An assignment where the vendor has implemented multiple functionalities in a single assignment shall qualify for respective functional categories. For instance, an AMI related assignment with an

additional Peak Load Management module shall be counted 1 assignment for AMI and 1 assignment for PLM.

The experience claimed in each functionality must be justified through submission of completion certificates indicating successful completion of the project from the Client. No marks shall be allotted if the requisite completion certificates for a cited credential are not submitted.

3. Solution and Approach Proposed by the Vendor (500 Marks)

The overall approach proposed by the vendor shall be rated on the basis of the following criteria:

3.1. Proposal Presentation and Understanding of Objectives (20 Marks)

The vendor shall present a detailed approach and methodology for the respective assignment. This would capture the vendor's understanding of the scope of work. The vendor shall identify the needs/ requirements of the utility with respect to the functionalities proposed as a part of the pilot project and prepare a well-structured and cogent approach for addressing the requirements.

3.2. Quality of Methodology / Solution Proposed (205 Marks)[1]

The action plan proposed by the vendor shall comprise solution architecture that is compatible with utility requirements and local conditions. For this purpose the vendor may extensively survey the pilot area to understand the geographic conditions and propose a best fit strategy. The approach shall also identify various interface points among different functionalities and utility systems/ processes.

[1]A detailed set of **Guidance Notes** have been provided as endnotes in this document for the evaluation parameters listed out under this section to make the evaluation of these questions objective to the extent possible. The guidance notes provide further detail on the relevance of the questions and provide a list of indicators/factors that would aid evaluation of the answers. Provided in Annexure 1

The quality of approach proposed by the vendor shall be evaluated under each of the following headings:

a. TECHNOLOGY PROPOSED (45 MARKS)

- Is the vendor's technology proven and accepted? ***(10 Marks)***
- Is the vendor authorized to use the proposed technology? ***(15 marks)***
- Does the vendor's technology provide requisite data warehousing capabilities (including Visual Engineering Environment)?***(10 Marks)***
- Does the vendor's track record indicate that its technology can be easily integrated with other systems including the critical legacy systems?***(10 Marks)***

b. HARDWARE AND SOFTWARE REQUIREMENTS (30 MARKS)

- Does the proposed system provide information requisite hardware and operating system requirements for system integration; and also tools required for managing applications?***(10 Marks)***
- Does the proposed system clearly indicate programming language/platform to be used in the system integration?***(10 Marks)***
- Does the proposed system cover Preventive Maintenance Activity (performance monitoring, system backup& restore, patch management, updates and troubleshooting) as well as spare parts for maintenance? ***(10 Marks)***

c. SECURITY AND SYSTEM STABILITY (70MARKS)

The following aspects shall be evaluated:

- Does the proposed system enforce assigned authorizations for controlling the flow of information within the Smart Grid information system and between interconnected Smart Grid information systems in accordance with applicable policy? ***(10 Marks)***

- Does the proposed system have the ability to execute an appropriate fail-safe procedure upon the loss of communications with other Smart Grid information systems or the loss of the Smart Grid information system itself? ***(10 Marks)***

- Does the proposed system documentation include system security manual containing functional properties of the security controls, configuration checklist, patch management, and firewall security setups for system vulnerability management against viruses? ***(10 Marks)***

- Are all external Smart Grid information system and communication connections identified and protected from intrusion, tampering or damage? ***(10 Marks)***

- Does the proposed system monitor and detect unauthorized changes to software and information? Does the proposed system notify the management authority when anomalies are discovered?***(10 Marks)***

- If some part of the product or its operation (e.g., hardware, software, command and control, data) will remain outside the system operator's direct control (e.g., in a remote data center, as part of a SaaS offering, and so on), does the proposal describe the parts outside the operator's control and describe the security practices applied to keeping those parts both safe and compliant with all applicable regulatory needs? ***(10 Marks)***

- Does the proposal include threat model(s) used to decide on the appropriate security features, security configuration controls, security designs, and software security approaches present in the proposed system. Does the proposal cover in details all types of security testing applied to the proposed system and list any current security testing artifacts available for review as per the RFP.***(10 Marks)***

d. COMMUNICATION AND INTER-OPERABILITY (35 Marks)

Communication (20 Marks)

- Does the proposed system clearly specify all makes/manufacturers, models, capacity, throughput, power rating, and standards/protocols for the equipment used in communication network? ***(5 Marks)***

- Does the proposed system include a detail description on receiving, storing and presenting data from non-meter sources, automation devices, RE sources, Network components configurable for different pricing plans (e.g.,Time of Use/ Critical Peak Pricing) as per RFP requirement?***(5 Marks)***

- Does the proposed system providenecessary description of the head end system/ Data concentrator functionality; and does it support all functionality required by the utility?***(5 Marks)***

- Does the proposed system include adequate interface with already existing IT systems of the utility– GIS, IT-applications?***(5 Marks)***

Inter-operability (15 Marks)

- Does the proposed system contain requisite details on the integration of new equipment (e.g., field devices, central systems, communication & networking systems) and integration of a new or existing central system Processor(if exists) as per requirement in the RFP?***(5 Marks)***

- Does the proposed system provide description of integration system database to be used and plan to be adopted to ensure inter-operability with equipment and applications?***(5 Marks)***

- Does the proposed system provide listing of required/desired standards (e.g., IEC, BIS, IEEE, etc.) complied with, and their areas of application? ***(5 Marks)***

e. ARCHITECTURE FLEXIBILITY AND SCALABILITY (25 Marks)

- Is the vendor's technology offering capable of upgrade and scaling up with minimum impact through changes in technology? ***(10 Marks)***

- Does the proposed system provide distributed architecture that includes available technology options, criteria for selecting the proposed technology, technical specifications of the products and the functional description of IT applications?***(10 Marks)***

- Does the proposed system describe in detail (with critical/non-critical classification) the interoperability, evolvability and scalability in order to accommodate new features and functions in future?***(5 Marks)***

3.3. Additional Smart Grid Functionalities beyond those already proposed for respective Pilot (Innovation) / Comments or Deviations on TOR (80 Marks)

The vendor may propose additional functionalities to be taken up as a part of the smart grid project in that area. These would be out of the scope of work for the project. However, the vendor may be given additional marks for any such functionality which would provide significant advantages to the utility. Similarly, the vendor may also point out any deviations from the ToR that might not be achievable either in the stipulated time or otherwise. These comments can then, as per the requirement of the utility, added to the ToR.

(20 Marks for each functionality delivered with a maximum of 80 marks)

In case deviations are proposed, the vendor must provide reason for such deviation. The Utility during the evaluation has to find/confirm the deviations acceptable in view of the new/alternative features proposed.

3.4. Work Program (including estimated duration of implementation) and approach to Project Management- (40 Marks)

This will include the overall work plan with critical interim milestones and overall time for delivering the complete solution. In addition the vendor's smart grid project management plan shall be evaluated on the following aspects:

- Does the vendor have a plan for managing the activities of the team and collaborative deployment of solutions to be delivered by subcontractors and selected sub-vendors?***(10 Marks)***
- Does the vendor have an adequate plan for timely completion of deliverables/roll-out of solution and adherence to the overall project schedule? ***(10 Marks)***
- Does the plan provide a framework for monitoring the project status including hot spots, progress and bottlenecks during the system implementation? ***(10 Marks)***
- Does the approach have a plan for foreseeing and mitigating risks including appropriate contingency plans? ***(10 Marks)***

3.5. Performance Assurance (115marks)[2]

The vendor shall provide the factory level performance quality of the proposed solution, along with certification/self-declarations for factory acceptance tests. In addition, the vendor should also provide expected field level performance and any deviations from the factory level performance tests.

The utility may stipulate a certain percentage of allowable deviation and the vendor would be graded accordingly. Key attributes that shall be monitored by the utility include:

- **Reliability of the system** (measure by success rate of the system to deliver data, signals, from the field level equipment to head end system) - ***(50 Marks -*** *based on factory acceptance tests)*
    - 98-100% reliability - 50 Marks
    - 96-98% reliability - 40 Marks
    - 94-96% reliability - 30 Marks
    - Below 94% - 0 Marks

- **System response time and data reading acquisition speed**(in Minutes) - ***(50 Marks -*** *based on factory acceptance tests)*
    - < 5 minutes - 50 Marks
    - 5 -10 minutes - 40 Marks
    - 10-15 minutes - 30 Marks
    - >15 minutes - 0 Marks

- **Submission of Detailed Quality Assurance Plan** by the vendor including monitoring quality standards of sub-contractors and sub-vendors ***- (15 Marks)***

[2] Warranty of the system has not been mentioned as part of the evaluation. It is presumed that this must be covered in the eligibility requirement or necessary conditions to be met by all vendors.

3.6. Plan for Knowledge Transfer, Capacity Building in the Utility and Customer Outreach - (40 Marks)

The vendor shall prepare a capacity building plan for the utility personnel. Knowledge transfer shall be initiated through field level training, operation manuals, reading materials, simulations etc. The vendor may also propose a sunset period after the completion of the project during which online and offline support would be provided to the utility.

a) Training (10 Marks)

- Has the vendor proposed a comprehensive and robust training and capacity building plan for the utility personnel? ***(10 Marks)***

b) Knowledge Transfer (20 Marks)

- ***Has the vendor provided a plan for handholding the utility post the commissioning of the solution? (20 Marks)***[3]

c) Customer Outreach and Impact(10 Marks)

- Does the proposed system describe how the customer data will be acquired and used to design suitable outreach programs to create maximum impact on business operations?***(10 Marks)***

[3] This is measured through number and level of experience of people proposed to be deployed on field post commissioning of the solution; and whether documented operational guidelines (including those for reconfiguring the system in case of market changes) are proposed to be provided to the Utility by the vendor.

4. Key Personnel (200 Marks)

The core team shall comprise of the following five experts:

- **Expert 1 (60 Marks)-** Team Leader/Project Manager - Expert in Project Management, and System Integration covering application software, hardware and network installation, integration design, and ability to manage multiple partners with different skill sets in different technology domains.
- **Expert 2 (35 Marks)** - Expert in Utility Management with experience in business process engineering, distribution automation, SCADA and DMS etc
- **Expert 3 (35 Marks):** Expert in cyber security related aspects covering planning and implementing high level system security requirements, managing data privacy and confidentiality, information flow through adequate authorizations, threat modeling and security testing.
- **Expert 4 (35 Marks):** Expert in metering and related aspects covering installation and management of smart meters, DCU/modems, last mile connectivity, head end system and MDMS
- **Expert 5 (35 Marks):** Expert in implementing communication protocols, implementing applications using different communication technologies and ensuring communication inter-operability across applications/functionalities.

Within each CV, the following evaluation metric will be followed:

- General qualifications (Relevant education and training and experience): (25% weightage)
  - Adequacy for the Assignment (Experience evaluated through number of completed assignments, with full marks for 5 completed assignments. For assignments less than 5, marks to be prorated accordingly): (50% weightage)
- Percentage time proposed in the field: (25% weightage)

The Team Leader/Project Manager should be dedicated for the duration of the project. The above team can further be strengthened with support team across various disciplines necessary to implement the solution in a time bound manner.

(Please Note: In case of pilots with functionalities such as Renewable Energy Integration or Distributed Generation, the Employer may specify additional personnel (1 no.) with expertise in Grid Integration of Renewable Energy or Distributed Generation respectively.)

Further, except as the Employer may otherwise agree, no changes shall be made in the core team of above five experts. If, for any reason beyond the reasonable control of the SGIA, such as retirement, death, medical incapacity, among others, it becomes necessary to replace any of the core team members, the SGIA shall provide as a replacement a person of equivalent or better qualifications. Such replacement will be subject to approval of the Employer.

Guidance Notes

Parameter	Why is it Important?	How will it be Measured?
Technology Proposed (45 Marks)		
Is the vendor's technology proven and accepted? ***(10 Marks)***	• Proven technology implies lower risk and higher reliability • Acceptability provides confidence of using a particular technology • Untested functionality may affect time required for system readiness and longer term reliability	• References where the technology has been deployed - through successful completion certificates from the Vendor's Client. For instance in case of deployment of communication technology references of use of PLC/ RF Mesh and the success rate achieved can be shared through appropriate certification from the client. • Demonstration of Utilities/Field Locations where technology has been deployed (including contact details of nodal officers.)
Is the vendor authorized to use proposed technology? ***(15 marks)***	• This might lead to IPR issues due to which might lead to delay in implementation	• The vendor must submit authorization certificates from the entity owning the proposed technology
Does the vendor's technology provide requisite data warehousing capabilities (including Visual Engineering Environment)? ***(10 Marks)***	• Important since scaling up would require dealing with larger volumes of data • Data analytics functionality can be used for power quality assessment, theft detection, load profile analyses, and market settlement calculations	• Vendor to specific data storage across the solution in gigabytes. Marks to be allotted accordingly •

Parameter	Why is it Important?	How will it be Measured?
Does the vendor's track record show that its technology can be easily integrated with other systems including the critical legacy systems? ***(10 Marks)***	• Technology compatibility with multiple applications and systems is necessary for successful operation in the real life utility situations • Demonstration of experience results in reducing risk and increasing the probability of success	• Demonstrated experience of integrated solution implementation - through successful completion certificates from the client • Factory acceptance test results where inter-operability between sub-vendor equipment and multiple functionalities should be demonstrated - Should be open to independent testing by the Utility.
Hardware and Software requirements (30 Marks)		
Does the proposed system provide information on minimum hardware and operating system requirements for system integration; and also tools required for managing applications?***(10 Marks)***	• To ensure necessary hardware and software required for integration is covered under vendor's scope • No separate cost implications are imposed on the Utility	• List of hardware and software proposed to be deployed on the field along with its complete specification by the vendor as part of the solution • Defining the integration points with the Utility systems
Does the proposed programming language/platform facilitate system integration?***(10 Marks)***	• Necessary to ensure compatibility and understanding by the utility IT personnel • Necessary for equipment and application inter-operability	• Language and platform proposed to be adopted specified clearly in the RfP response • Outputs from the system at various interfaces must bein a format that can be used in multiple ecosystems. e.g. XML, API (Application Program Interface)

Parameter	Why is it Important?	How will it be Measured?
Does the proposed system cover Preventive Maintenance Activity (performance monitoring, system backup & restore, patch management, updates and troubleshooting) as well as spare parts for maintenance? ***(10 Marks)***	• Necessary for preventing system failure • Necessary for restoration in case of system failures • Promotes Upgradation • Necessary for change control and system maintenance	• Vendor has rated the equipment and software proposed to be provided based on their vulnerability • Provides provision for replacement of parts with high vulnerability (during warranty period) • Provides unit rates for such parts post the warranty period up to a specified period • Vendor has described the patch management mechanism
SECURITY AND SYSTEM STABILITY (70 Marks) **(to be refined further through discussions with ISGTF and select technical experts)*		
Does the proposed system enforce assigned authorizations for controlling the flow of information within the Smart Grid information system and between interconnected Smart Grid information systems in accordance with applicable policy? ***(10 Marks)***	• Permits only authorized user to access the system • Reduces vulnerability to attacks on the proposed and linked systems	• Provision of authorized access (in layers) and warning messages • Features related to Grant of rights and privileges (modify, update etc.) etc. built up in the solution

Parameter	Why is it Important?	How will it be Measured?
Does the proposed system have the ability to execute an appropriate fail-safe procedure upon the loss of communications with other Smart Grid information systems or the loss of the Smart Grid information system itself? ***(10 Marks)***	• Provides self-healing features • Enables easy system restoration in case of partial failures • Prevents loss of critical information	• Vendor to demonstrate self-healing capabilities of the system during the factor acceptance test • Vendor to provide certification from previous system testing
Does the proposed system documentation include system security manual containing functional properties of the security controls, configuration checklist, patch management, and firewall security setups for system vulnerability management against viruses? ***(10 Marks)***	• Ensures guidance to system users • Provides ability to restore the security process in case of corruptions/attacks/partial faults	• Requisite documentation provided or not • Relevant set-up/installation files and briefing on their features provided or not

Parameter	Why is it Important?	How will it be Measured?
Are all external Smart Grid information system and communication connections identified and protected from intrusion, tampering or damage? ***(10 Marks)***	• Need to protect system from cascade failures through adequate protection at interface levels • Need to avoid compromising data integrity, confidentiality, and hacking	• Demonstrated Islanding features that isolate the system in case of intrusions, partial failures etc. • Features for reconnection post system restoration • Capabilities such as cryptography/data encryption, system, identification and authentication control The above can be demonstrated during the factor acceptance test.
Does the proposed system monitor and detect unauthorized changes to software and information? Does the proposed system notify the management authority when anomalies are discovered? ***(10 Marks)***	• Provides warning signals in case of systemic intrusions and failures • Provides alerts to authorized officers and management • Records anomalies for security checks and appropriate action	• Capabilities and features to be demonstrated during the factory acceptance test • Commitment to provide detailed manual of features provided along with the solution • Availability of security audit features • Certificates from previous system testing

Parameter	Why is it Important?	How will it be Measured?
If some part of the product or its operation (e.g., hardware, software, command and control, data) will remain outside the system operator's direct control (e.g., in a remote data center, as part of a SaaS offering, and so on), does the proposal describe the parts outside the operator's control and describe the security practices applied to keeping those parts both safe and compliant with all applicable regulatory needs? ***(10 Marks)***	• Necessary to keep the system secure • Need to protect the system's core • Define all vulnerable points in the system and security measures for protection	• High security hardware and software that are not required to be accessed on day to day basis is identified separately (serves as core of the solution) • Maintenance practices provided to keep this core secure and well-functioning are defined in a separate manual • Tenure for Offline/Onsite support committed by the vendor in case the core is required to be rectified • Security documentation

Parameter	Why is it Important?	How will it be Measured?
Does the proposal include any threat model used to decide on the appropriate security features, security configuration controls, security designs, and software security approaches present in the proposed system. Does the proposal cover in details all types of security testing applied to the proposed system and list any current security testing artifacts available for review as per the RFP. ***(10 Marks)***	• To ensure secure and well-functioning system at all time • To inculcate behaviour of preventive maintenance	• Security procedures, layers and testing procedures to be demonstrated in the factory acceptance test • Frequency of such testing • Debugging mechanism proposed
COMMUNICATION AND INTER-OPERABILITY (35 Marks)		
Communication		
Does the proposed system clearly specify all makes/manufacturers, models, capacity, throughput, power rating, and standards/protocols for the equipment used in communication network? ***(5 Marks)***	• To ensure equipment used is of reputed make and of requisite configuration • Ensure compliance with internationally and nationally accepted standards	• List of equipment, makes/manufacturers, models, capacity, throughput, power rating, and standards/protocols for the equipment to be provided by the vendor as part of the solution. • Utility to assess: o Make/Manufacturer (Reputed or not) o Adequacy of specification of the equipment o Standards/Protocols complied with

Parameter	Why is it Important?	How will it be Measured?
Does the proposed system include detailed description on receiving, storing and presenting data from non-meter sources, automation devices, RE sources, Network components configurable for different pricing plans (e.g., Time of Use/ Critical Peak Pricing) as per RFP requirement? ***(5 Marks)***	• Data/information from non-meter sources may be of use in specific cases • Necessary to ensure that the Utility requirement are met completely • Necessary to ensure compatibility with existing and emerging pricing regimes	• Adequate description is provided by the Vendor based on the functionalities required by the Utility • Ability of network components to be configured to existing and emerging pricing regimes through time slots available, data recording capabilities etc.
Does the proposed system provide requisite description of the head end system/ Data concentrator functionality; and does it support all functionality required by the utility? ***(5 Marks)***	• Important to understand operational aspects of head end system • Necessary to assess that required functionalities exist	• Detailed description and functionalities of the head end system and DCU provided - these functionalities meet Utility the minimum requirement (based on the functionalities proposed) • Additional functionalities (than the minimum expected) could also be provided that seek higher marks
Does the proposed system include adequate interface with already existing IT systems of the utility– GIS, IT-applications? ***(5 Marks)***	• Minimizes data duplicity • Provides way for seamless integration • Promotes consistency	• Identification of clear interface points by the Vendor, which includes the existing utility applications/equipment • Inputs from these applications integrate with the proposed solutions
Inter-operability		

Parameter	Why is it Important?	How will it be Measured?
Does the proposed system contain requisite details on the integration of new equipment (e.g., field devices, central systems, communication & networking systems) and integration of a new or existing central system Processor (if exists) as per requirement in the RFP? ***(5 Marks)***	• To ensure inter-operability among new vendor (lead bidder) and its sub-vendors • Ensure seamless integration and functioning	• Adequate details to ensure integration provided in the vendor's response • References provided by the vendor indicate satisfactory functioning and integration • Factory acceptance test to demonstrates inter-operability between equipment/field division and central systems and processors
Does the proposed system provide required description of integration system database to be used and plan to be adopted to ensure inter-operability with equipment and applications? ***(5 Marks)***	• To ensure integration of solution with the Utility applications and system	• Detailed plan that identifies interface points; provides strategy to ensure inter-operability by proposing outputs in a format that can be used in multiple ecosystems. e.g. XML, API (Application Program Interface)
Does the proposed system provide listing of required/desired standards (e.g., IEC, BIS, IEEE, etc.) complied with, and their areas of application? ***(5 Marks)***	• Ensures that the system provided complies to industry standard (national/international)	• List of equipment and standards complied with. Utility to assess the adequacy of the standard adopted - i.e. whether the standards is in line with Industry practice.

Parameter	Why is it Important?	How will it be Measured?
ARCHITECTURE FLEXIBILITY AND SCALABILITY (25 Marks)		
Is the vendor's technology offering capable of upgrade and scaling up with minimum impact through changes in technology? ***(10 Marks)***	• Necessary for scaling up the pilots • Understanding the new requirements that may come up during scale up	• Demonstrated during factory acceptance test through scalability test undertaken through use of simulations. Vendor should also specify expansion multiples of the solution (example 10X/100X/1000X, X being the customer coverage of the solution)
Does the proposed system provide distributed architecture that includes available technology options, criteria for selecting the proposed technology, technical specifications of the products and the functional description of IT applications? ***(10 Marks)***	• Provides for up-gradation of discreet modules incase part of the technology becomes obsolete or new technology comes up	• Architecture proposed by vendor is modular, wherein multiple solutions function together through identified interface points where the information flows happen in interoperable formats
Does the proposed system describe in detail (with critical/non-critical classification) the interoperability, evolvability and scalability in order to accommodate new features and functions in future? ***(5 Marks)***	• Permits reconfiguration of existing modules to accommodate new features, new developments, changes in regulations etc.	• Architecture proposed by vendor is modular that permits reconfiguration the system by authorized users to accommodate market changes

VOLUME II

TECHNICAL SPECIFICATION FOR AMI AND PLM

WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED

TABLE OF CONTENTSTABLE OF APPENDICES 6

SECTION 1. INTRODUCTION AND GENERAL REQUIREMENTS 8

1.1. BACKGROUND 8
1.2. DEMOGRAPHY 10
1.3. KEY PARTICULARS OF SILIGURI TOWN 10
1.4. INTRODUCTION 11
1.5. PROJECT OVERVIEW 11
1.6. SCOPE AND GENERAL REQUIREMENTS 12
1.7. EXCLUSIONS FROM CONTRACTOR'S SCOPE 13
1.8. GENERAL REQUIREMENTS 13
1.9. INTEGRATION WITH OTHER SYSTEMS 15
1.10. GENERAL RESPONSIBILITIES AND OBLIGATIONS 15
1.10.1. Responsibilities for the Implementation Plan 15
1.10.2. Contractor's Responsibilities and Obligations 15
1.10.3. The Employer Responsibilities and Obligations 17
1.11. GENERAL BIDDING REQUIREMENTS 18
1.12. TABLE OF COMPLIANCE 20
1.13. ORGANIZATION OF THE TECHNICAL SPECIFICATION DOCUMENT 20
1.14. APPLICABLE STANDARDS 21

SECTION 2. ADVANCED METERING INFRASTRUCTURE (AMI) SYSTEM 23

2.1. GENERAL AMI SYSTEM REQUIREMENT 23
2.2. SMART METERS 24
2.2.1. Single Phase Smart Meter 24
2.2.2. Three Phase Smart Meter 40
2.2.3. Three Phase CT operated Meter 56
2.3. DATA CONCENTRATOR UNIT (DCU) 70
2.3.1. Hardware & Power Supply 70
2.3.2. Configuration, Functionality & Interface 70
2.3.3. Communication 71
2.3.4. Testing of the DCU 72
2.4. INSTALLATION OF ADVANCED METERING INFRASTRUCTURE (AMI) 72
2.4.1. Installation of Smart Meter 73
2.4.2. Installation of Data Concentrator Unit (DCU) 74
2.5. METER DATA ACQUISITION SYSTEM (MDAS) 74
2.5.1. Configuration 75
2.5.2. Communication 76
2.5.3. Monitoring and reporting capability 76
2.5.4. Integration 76
2.5.5. Others 77
2.6. METER DATA MANAGEMENT SYSTEM (MDM) 77
2.6.1. Functional Requirements 77
2.6.2. Data Validation, Estimation, and Editing (VEE) 78
2.6.3. Billing Determinants Calculations 79
2.6.4. Exception Management 80
2.6.5. Service Orders 80
2.6.6. Customer Service Support 80
2.6.7. Analysis 81
2.6.8. Reporting 81
2.6.9. Revenue Protection Support 82
2.6.10. Demand Control/Demand Response Support 82

2.6.11. User Interface *82*
2.6.12. Integration with Other System *83*
2.6.13. Performance Testing *84*
2.6.14. Technical Obsolescence *85*
2.7. HAND HELD UNIT (HHU) 85
2.7.1. General Technical Requirement *85*
2.7.2. Physical Characteristics *86*
2.7.3. Physical interface *87*
2.7.4. Hardware and Software requirement *88*
2.7.5. Data Security *89*
2.7.6. Type Test *89*
2.7.7. Acceptance Tests for HHU and Software *90*

SECTION 3. PEAK LOAD MANAGEMENT SYSTEM 92

3.1. PEAK LOAD MANAGEMENT FUNCTIONALITIES 92

SECTION 4. HARDWARE REQUIREMENTS 94

4.1. GENERAL 94
4.2. TECHNICAL REQUIREMENTS FOR HARDWARE 94
4.3. HARDWARE CONFIGURATION 95
4.4. SERVERS 95
4.5. WEB SERVER 95
4.6. NETWORKING EQUIPMENT 96
4.6.1. Firewall *96*
4.6.2. Routers *96*
4.6.3. Host based Intrusion Detection System & Intrusion Prevention System (Network Based) 96
4.6.4. Local Area Network (LAN) and device interfaces *96*
4.6.5. Storage Area Network (SAN) based Storage *96*
4.7. WORKSTATION CONSOLES 96
4.8. PRINTERS 97
4.9. GPS BASED TIME FACILITY 97
4.10. CONFIGURATION REQUIREMENTS 97
4.11. ERROR DETECTION AND FAILURE DETERMINATION 97
4.11.1. Server Errors *98*
4.11.2. Device Errors *98*
4.11.3. Software Errors *98*
4.12. HARDWARE REDUNDANCY AND CONFIGURATION MANAGEMENT 98
4.13. TECHNICAL OBSOLESCENCE 98
4.14. POWER SUPPLY FOR CONTROL CENTRE EQUIPMENT 99
4.15. FURNITURE 99
4.15.1. Workstation desk *99*
4.15.2. Chairs *99*
4.16. ENVIRONMENTAL CONDITIONS 100
4.17. ACOUSTIC NOISE LEVEL 100
4.18. GENERAL CONSTRUCTION REQUIREMENTS 100
4.18.1. Panels *100*
4.18.2. Enclosure Grounding *101*
4.18.3. Interconnections *101*
4.19. TECHNICAL SPECIFICATION FOR HARDWARE 101

SECTION 5. SOFTWARE REQUIREMENTS 113

5.1. GENERAL REQUIREMENTS 113
5.2. SOFTWARE STANDARDS 113
5.3. DESIGN AND CODING STANDARDS FOR AMI/MDM/PLM 113
5.3.1. Applications 113
5.3.2. Operating System 114
5.3.3. Time and Calendar Feature 114
5.3.4. Network Software 114
5.3.5. Network Communication 114
5.3.6. System Security 114
5.3.7. Access Control 115
5.3.8. Remote Diagnostic 115
5.3.9. Network services 115
5.3.10. Network Management system (NMS) 116
5.3.11. Database development tools 117
5.3.12. Database Management 117
5.3.13. Database Integration 118
5.3.14. Tracking Database Changes 118
5.3.15. Initial Database Generation 118
5.3.16. Development System as a Test Bench 118
5.4. DATABASE AND DISPLAY GENERATION AND MANAGEMENT 118
5.4.1. Display Generation and Integration 119
5.5. SOFTWARE UTILITIES 120
5.5.1. Auxiliary Memory Backup utility 120
5.6. ON-LINE MONITORING DIAGNOSTICS 120
5.7. DATA EXCHANGE UTILITIES 121
5.7.1. Data exchange through WEB services 121
5.8. OTHER UTILITY SERVICES 121
5.9. DEVICE CONFIGURATION OF NETWORK EQUIPMENT 122
5.9.1. Firewall 122
5.9.2. Router 122
5.9.3. Intrusion Detection & Prevention System 123
5.10. CYBER SECURITY 124

SECTION 6. INSPECTION, TESTING AND OPERATION ACCEPTANCE 126

6.1. GENERAL 126
6.2. QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM 126
6.3. SCOPE OF DUTIES OF EMPLOYER 127
6.4. INSPECTION CERTIFICATE 127
6.5. INSPECTION AND TEST 129
6.5.1. Inspection 129
6.5.2. Test Plans & Procedures 129
6.5.3. Test Records 130
6.5.4. Reporting of variances 130
6.5.5. Factory Test 130
6.5.6. Field Performance Test 132
6.5.7. Field Installation Test 132
6.5.8. Availability Test 133
6.5.9. Test Duration and Criteria for Acceptance 134
6.6. CRITERIA FOR SUCCESSFUL OPERATION 135
6.7. CONTRACTOR'S MAINTENANCE RESPONSIBILITY TILL OPERATIONAL ACCEPTANCE 135
6.8. TYPE TESTING 135

SECTION 7. TRAINING REQUIREMENTS 138

7.1. DESCRIPTION 138
7.2. GENERAL 138
7.3. TRAINING REQUIREMENTS FOR SMART METER, DCU AND ASSOCIATED COMMUNICATION SYSTEM 138
7.3.1. Smart Meter Course 138
7.3.2. DCU Course 139
7.4. TRAINING REQUIREMENTS FOR MDAS, MDM, PROTOCOL AND PLM COURSE 139
7.4.1. MDAS Course 139
7.4.2. MDM Course 140
7.4.3. Protocol course 141
7.4.4. PLM Course 141
7.5. TRAINING REQUIREMENTS FOR COMPUTER SYSTEM HARDWARE COURSE 141

SECTION 8. PROJECT MANAGEMENT AND IMPLEMENTATION PLAN 144

8.1. PROJECT MANAGEMENT 144
8.2. PROJECT IMPLEMENTATION PLAN 144
8.3. PROGRESS REPORT 144
8.4. TRANSMITTALS 145
8.5. REVIEW MEETING 145
8.6. ROLE OF CONSULTANT 145
8.7. DOCUMENT REVIEW AND APPROVAL RIGHTS 145
8.8. PROJECT SCHEDULE 146
8.8.1. Implementation Schedule 146
8.8.2. Contractor Activities 147
8.8.3. The Employer Activities 148
8.8.4. Documentation Schedule 148
8.8.5. Training Schedule 148
8.8.6. Project Progress Reporting 148
8.9. IMPLEMENTATION PLAN 149
8.9.1. Implementation Steps 149

SECTION 9. DOCUMENTATION AND DELIVERABLES 151

9.1. GENERAL 151
9.2. INSTRUCTIONS 151
9.3. HARDWARE DOCUMENTATION REQUIREMENTS 151
9.4. SOFTWARE DOCUMENTATION REQUIREMENTS 152
9.4.1. Software Inventory 152
9.4.2. Functional Description 152
9.4.3. Software Design 152
9.4.4. Database Documentation 153
9.4.5. User Documentation 153
9.4.6. System Administration Documentation 153
9.5. TEST DOCUMENTATION 154
9.6. TRAINING DOCUMENTATION 154

SECTION 10. MAINTENANCE AND SUPPORT SERVICES 156

10.1. GENERAL 156
10.2. MAINTENANCE SUPPORT 156
10.3. INTEGRATION OF NEW DEVICES (METERS, DCU, NETWORKING DEVICES, INTEGRATION WITH EXISTING SYSTEM ETC.).THE CONTRACTOR SHALL MAINTAIN SPARES IN ORDER TO ACHIEVE THE AVAILABILITY CRITERIA DEFINED IN THIS DOCUMENT PREVENTATIVE MAINTENANCE ACTIVITY 157
10.3.1. Hours of Cover 157

10.3.2. Service Response requirements 158
10.4. MONITORING 158
10.4.1. Log Monitoring 158
10.4.2. Resource Monitoring 158
10.4.3. Cyber Security System Monitoring 159
10.5. PATCH MANAGEMENT 159
10.6. PHYSICAL MAINTENANCE 159
10.7. INTEGRATION OF NEW EQUIPMENT 160
10.8. PROBLEM/DEFECT REPORTING 160
10.9. SEVERITY LEVELS 160
10.9.1. Severity-1(Urgent Support) 160
10.9.2. Severity-2 161
10.9.3. Severity-3(standard support) 161
10.9.4. Severity-4(General Technical Help) 161
10.10. RESPONSE & RESOLUTION TIME 161
10.11. AVAILABILITY AND MAINTENANCE CHARGES PAYMENT CALCULATION 162
10.11.1. Availability computation for the system 163
10.11.2. Payment of maintenance charges (based on System availability) 163
10.12. CONTRACTOR'S OBLIGATIONS AND RESPONSIBILITY 163
10.13. RESPONSIBILITIES OF EMPLOYER 164
10.14. RESPONSIBILITY MATRIX 164

APPENDIX-A 168

APPENDIX-B 173

APPENDIX-C 178

APPENDIX-D 206

APPENDIX-E 208

APPENDIX-F 210

Table of Appendices

Appendix - A General Information 169
Appendix - B Bill of Quantity 174
Appendix - C Data Requirement Sheet 179
Appendix - D System Sizing Requirements 207
D - 1. Sizing Parameter 207
Appendix - E Proposed Network Architecture 209
Appendix - F DLMS/COSEM Interoperability Profile 211
F - 1. Parameters to be captured for Single Phase Meter 212
F-1.1. Events 214
F - 2. Parameters to be captured for Three Phase Meter 216
F-2.1. Events 219

Section 1

Introduction and General Requirements

Section 1. Introduction and General Requirements

1.1. Background

Siliguri also known as Gateway of North East India is a city in the Indian state of West Bengal. Siliguri is located on the banks of the Mahananda River and the foothills of the Himalayas, it is a principal commercial, tourism, transportation, and educational center of North Bengal. The city has a considerable number of factories and industries. In the project area of Siliguri, most of the consumers are commercial and domestic consumers. This town is newly populated however due to fast pace of industrial growth it is facing challenges to provide reliable electricity supply. Electricity Distribution in the project area of Siliguri town is done by WBSEDCL. The map of West Bengal is given in figure 1.1

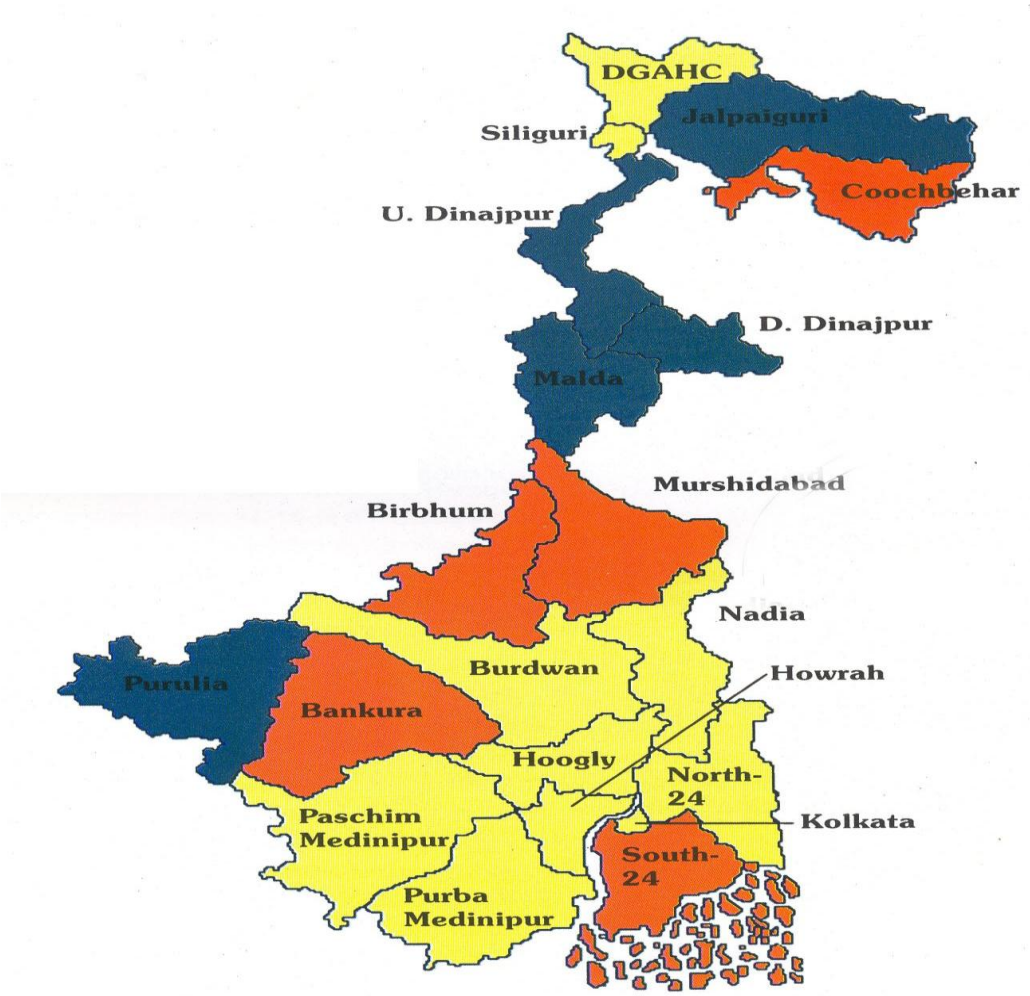


Figure 1.1: Map of State of West Bengal

The supply of electricity in Siliguri town is maintained by WBSEDCL. WBSEDCL intends to implement Smart Grid Pilot project in **Siliguri town** comprising of Advanced Metering Infrastructure (AMI) & Peak Load Management (PLM) attributes of Smart Grid. A Detailed Project Report (DPR) was prepared in this regard and submitted to Ministry of Power for approval. MoP has approved the DPR to undertake Smart Grid implementation. WBSEDCL has entrusted Power Grid Corporation of India Limited (POWERGRID) as Advisor- cum-Consultant for implementation of Pilot Smart Grid project.

1.2. Demography

Siliguri town has a total area of about 42 km². Detailed statistics as per Census 2011 are given inTable1-1.

Table 1-1: Demographic Statistics

Profile Of Siliguri Town		
Place, Town	Name	Siliguri
District, State	Name	Darjeeling, West Bengal
Total Area of Coverage	Sq. Km	42
Total Population	No.	4,72374
Number of Residential Consumers	No.	1,07,317
Number of Commercial Consumers	No.	24,143
Number of Industrial Consumers	No	830
Number of other consumer	No.	1137
AT&C loss	%	17.98

1.3. Key Particulars of Siliguri Town

Siliguri town has 100% electrification. It has 5275 no. of consumers, predominantly domestic and commercial consumers. Key parameters are as below:

PARTICULARS	DATA
Peak Hour Loading	3 MVA

Annual Energy Input (MU)	8.89 MU
Annual Energy Billed (MU)	7.46 MU
Annual Collected Energy(Through revenue)	7.10 MU
Annual Unbilled Energy(MU)	1.43 MU
Annual Uncollected Energy	0.36 MU
Total Energy Loss	1.79 MU
Billing efficiency (%)	83.91 %
Collection efficiency (%)	95.17 %
AT&C losses (1-Billing efficiency X Collection efficiency) *100 %	20.13 %

- No. of Consumers : 5275
  - Domestic : 4789 (90.78%)
  - Commercial : 436 (8.26%)
  - Street Light : 38 (0.72%)
  - Industrial : 12 (0.22%)

1.4. Introduction

This Volume II of the Bid Documents describes the Technical Specifications for Advanced Metering Infrastructure (AMI) & Peak Load Management (PLM) as part of Smart Grid solutions which includes Smart Meter, Data Concentrator Unit(DCU), Meter Data Acquisition System (MDAS), Meter Data Management System (MDM), communication system, Software and Hardware for Control Centre. The purpose of this section is to provide introduction, general information, general requirements and to define the scope of the Project.

1.5. Project Overview

The Smart Grid Project shall establish Advanced Metering Infrastructure system (AMI) and Peak Load Management System (PLM). The project envisages establishment of control centre along with supply, installation, testing and commissioning of complete AMI and PLM system involving Smart Meters, DCUs, MDAS, MDM, PLM, Communication system,

hardware & software for control centre etc. GIS mapping and billing & collection system being implemented by WBSEDCL shall also be integrated with AMI system.

1.6. Scope and General Requirements

The scope of work shall include, a complete conformity with subsequent sections of the specifications; site survey, planning, design, engineering, manufacturing, supply, transportation & insurance, delivery at site, unloading, handling, storage, installation, integration, testing, commissioning, demonstration for acceptance, training, maintenance and documentation of:

1) Single Phase Smart Meter with suitable in-built communication technology
2) Three Phase Smart Meter with suitable in-built communication technology
3) CT Operated Three Phase meter (except CT) with suitable in-built communication technology
4) Data Concentrator Unit (DCU) with suitable in-built communication facilities
5) All associated hardware and accessories for installation of Smart meter & DCU such as wire, meter box, FRP board etc.
6) Meter Data Acquisition System (MDAS)
7) Meter Data Management (MDM) System
8) Peak Load Management (PLM) System
9) Smart Grid Control Centre hardware such as Server, Workstation, Storage, Network devices & printer, Display system etc.
10) Other necessary software with valid licence
11) Integration with GIS mapping and Billing & Collection system of R-APDRP
12) Planning, deployment, tuning the communication system including RF, PLC and GPRS to meet performance requirements as specified in the bid document
13) Cabling associated with communication systems and power supply source
14) GSM/GPRS SIM cards or any other alternative communication and 2x2 Mb/s static ISP connection in control room

The detailed BoQ is given in Appendix. The Contractor has to carry out the detailed survey and collect the required data during survey. All other associated works/items described in the technical specifications for a viable and fully functional system is the responsibility of Contractor. The Contractor shall maintain the system for 5 year period from operational acceptance by WBSEDCL. During first of maintenance, contractor shall operate the system

also. The Contractor shall also bear the cost of recurring charges for GPRS and static ISP connection till completion of maintenance period.

The contractor shall establish the impact analysis of AMI and PLM functionalities, as required.

Sections 1 through 10 of this specification define the site survey, design, specification, performance, test and implementation requirements for AMI & PLM System.

1.7. Exclusions from contractor's Scope

The contractor shall be responsible for providing all the hardware & software, development of database, integration, testing and services required for commissioning of the project except

- Buildings
- Building Lighting System
- Interior of building
- Air conditioning
- Firefighting system
- A.C. input power supply
- Uninterruptible Power Supply (UPS)

1.8. General Requirements

The Contractor must conform to the requirements and provide any special equipment necessary to meet the requirements stated herein.

It should be noted that preliminary design information and bill of quantity (BoQ) specified in this specifications are indicative only. The Contractor shall verify the design data during the site surveys & detail engineering and finalise the BoQ as required for ultimate system design & development to meet performance requirements.

The Bidder's proposal shall address all functional and performance requirements within this specification and shall include sufficient information and supporting documentation in order to determine compliance with this specification without further necessity for inquiries.

Bidder may provide all applications in one suite or multiple modules to meet all AMI and PLM Technical Specification requirements.

The Bidder's proposal shall clearly identify all features described in the specifications or in any supporting reference material that will not be implemented; otherwise, those features shall become binding as part of the final contract.

An analysis of the functional and performance requirements of this specification and/or site surveys, design, and engineering may lead the Contractor to conclude that additional items (For example Communication repeater, router etc) are required that are not specifically mentioned in this specification. The Contractor shall be responsible for providing to the Employer at no added cost, all such additional items such that a viable and fully functional AMI & PLM System is implemented that meets or exceeds the capacity and performance requirements as specified .Such materials shall be considered to be within the scope of the contract. To the extent possible, the Bidders shall identify and include all such additional items in their proposal.

The offered items shall be designed to operate in varying environments. Adequate measures shall be taken to provide protection against contaminants, pollutants, water & moisture, lightning & short circuit, vibration and electro-magnetic interference etc.

The Contractor shall demonstrate a specified level of performance of the offered items during well-structured factory and field tests.

All equipment provided shall be designed to interface with other equipment and shall be supporting all present requirements and spare capacity requirement as required in order to achieve the availability criteria .

The Bidders are advised to visit sites (at their own expense), prior to the submission of the proposal, and make surveys and assessments as deemed necessary for proposal submission. The successful bidder (Contractor) shall be required to visit sites (All DT locations, sample consumer locations, control centre and project area) for site surveys. The site visits after contract award shall include all necessary surveys to assist the contractor to perform the design and implementation functions.

After the site survey the Contractor shall submit a survey report. This report shall include at least the following items; however, the exact format of the report shall be finalized by the Contractor with the approval of Employer.

1) Proposed routing of power, earthing, communication signal cables etc.
2) Confirmation of adequacy of Space and AC Power supply requirements.
3) Measurement of noise and location of DCUs
4) Identification of facility modifications, if required.
5) Identify all additional items required for interconnection with the existing/owner provided equipment/ facilities.
6) Requirement of modification to existing earthing arrangement of Smart Grid control centre and Distribution Transformer locations where DCU/Hardware are to be installed, if any.

1.9. Integration with other systems

The MDM being supplied under this contract is required to be integrated with the Billing data & collection system and GIS data system already procured by WBSEDCL under R-APDRP/ other contract. The integration shall address the needs including but not limited to meter data exchange for consumer indexing & billing, revenue analysis, reporting and insights as well as for leveraging the consumer indexing for AMI system analysis. WBSEDCL has already implemented contract for R-APDRP part A (IT). The Consumer Indexing and GIS asset mapping data shall be made available to Contractor. Billing & collection system is also implemented under R-APDRP. The Smart meter data shall be provided to billing & collection system for billing purpose.

The cabling and all associated hardware and accessories shall be provided and installed by the Contractor. The contractor shall be responsible for necessary integration with existing system including hardware, software and cabling. The contractor shall submit the approach paper in this regard.

1.10. General Responsibilities and Obligations

This section describes the general responsibilities and obligations of the Contractor and the Employer.

1.10.1. Responsibilities for the Implementation Plan

The Bidder's technical proposal shall include a project implementation plan and schedule spread over 18 months from date of award that is consistent with the implementation plan detailed in this specification. The Implementation plan shall include the activities of both the Contractor and the Employer, showing all key milestones and clearly identifying the nature of all information and project support expected from the Employer. The Employer and Contractor together shall finalise the detailed Implementation plan following award of the contract.

1.10.2. Contractor's Responsibilities and Obligations

Contractor's obligations include, but are not limited to, the following:

1) Provide a working system (go-live) that meets the functional and performance requirements of this specification.
2) Engineering and design specific to location including review of and conformance with local environment especially with respect to communication.
3) Development of installation, commissioning and safety guidelines and procedures for the complete system.
4) Project management, project scheduling, including monthly project reports documenting progress during the contract period.

5) Coordination with Employer staff, consultant and other concerned Contractors (R-APDRP) for phased implementation and system integration, testing & commissioning of the overall project

6) Engineering and technical assistance during the contract period

7) Site visits and studies necessary to identify and provide all equipment needed to implement the project especially the need for measuring appropriate signal strength for Suitable communication network.

8) Supply, installation and termination of all wires/cables for fully functional system.

9) Factory and site acceptance testing of all items including hardware, software & firmware provided.

10) Conduct type tests or provide documented evidence of type testing and BIS certification to the Employer.

11) Provide a Quality Assurance Plan ensuring the Employer access to the manufacturing process.

12) Shipment of all equipment and documentation to the Employer designated locations and/or staging areas.

13) Storing, Staging, maintenance and security of the staging area up to the operational acceptance including the full responsibility for protection from fire and theft of the supplied equipment.

14) Installation, testing & commissioning of all equipment/ systems such as Smart Meter, DCU, MDAS, MDM,PLM, Control centre hardware & software etc.

15) Provide necessary communication system for full functionality of AMI & PLM system

16) Integration of all consumer smart meters with MDM at the Smart Grid Control Centre.

17) Provide all additional equipment such as repeater, router etc. necessary to ensure full functionality of system.

18) Integration of Billing & collection system and GIS data of RAPDRP with MDM

19) Provide other site-installation specific items including FRP board and meter box.

20) Carry out minor civil works related to smart meter, DCU, any other field devices and hardware at Control Centre as required for installation.

21) All hardware, software, and firmware required to satisfy the requirements of this Specification.

22) All documentation and drawings as specified.

23) All required spare parts, maintenance aids, etc.

24) Maintenance and support of the items through final acceptance, and maintenance throughout the maintenance (AMC) period. The contractor shall maintain the spares for maintenance purpose.

25) Operation of system during first year of maintenance period.

26) Hardware, software, and firmware maintenance, debugging, and support of the equipment through final acceptance, and maintenance on all new equipment through the warranty period.

27) Due diligence in properly planning and executing the work so as to minimise inconvenience to consumer and ensuring there is no physical damage to consumer property.

28) The Contractor shall appoint key personnel for the project such as Project Manager, Design Engineer, Site Manager as well as Installation, testing and Commissioning Engineer.

29) Availability of service spares and expansion parts for the supplied items for a minimum period of seven (07) years from the date of operational acceptance in accord to the availability requirement.

30) Notification services for field updates to the hardware, software, and firmware.

31) Local conveyance support for WBSEDCL personal during removal of old meter.

32) Provide training

33) To borne the cost of employer including travel, boarding, lodging cost etc in case of testing and training requirements outside Siliguri.

34) Attend progress review meeting

35) Providing of necessary furniture (Swivel Chair: Godrej 9101A or equivalent, Workstation table: Godrej Work Desk 1 or equivalent, Printer Table: Godrej Trident Junior or equivalent) for smart grid control centre equipment

36) Providing the necessary SIM cards for DCU and 2x2 Mbit/s ISP connection in smart grid control centre till maintenance period inclusive of payment of recurring charges

37) Integration of DLMS / COSEM based new smart meters / DCU procured separately in the provided MDAS / MDM system till maintenance period.

Detailed descriptions of the Contractor's obligations, in relation to individual items and services offered, are delineated in other sections of this specification.

1.10.3. The Employer Responsibilities and Obligations

The Employer will provide the following items and services as part of this Project:

1) Review and approval of the Contractor's designs, drawings, survey reports and recommendations.

2) Review and approval of test procedures.

3) Participation in and approval of Type, Factory and Site acceptance tests.
4) Review and approval of training plans.
5) Providing support and access to facilities at the sites
6) Arranging necessary shutdowns and work permits.
7) Provide to the extent possible drawings for Smart Grid Control Centre building where equipment installations are planned.
8) Obtaining requisite statutory clearances and/or approvals as required to be taken by Employer for project work.
9) WBSEDCL will provide permissions as necessary for installation of Meters and DCUs so that the work of installation proceeds without any hindrance
10) Overall project management
11) Providing details of the consumer indexing and GIS mapping data carried out by the R-APDRP contractor
12) Providing A.C. power supply point for equipment
13) Resolving of dispute if any between consumers and contractor related to installation of smart meter and accessories in consumer premises.
14) Assistance in obtaining SIM cards and internet connections from service providers
15) Organise Project Review meetings
16) Provide open space for equipment storage

1.11. General Bidding Requirements

The Bidder shall be responsive to the technical requirements as set forth in this specification. The Bidder's proposal shall include the following:

1) The Technical Proposal including the documents listed in the table 1-2: Bid Documents Checklist shall be provided in the bid.

TABLE 1-2: BID DOCUMENTS CHECKLIST

S. No.	Description:	Enclosure Reference

TABLE 1-2: BID DOCUMENTS CHECKLIST

S. No.	Description:	Enclosure Reference	
1	Completed Data Requirement Sheets (As per **Appendix C** of Technical Spec Volume II)	Page no. Ref no.	
2	System Sizing Requirements as per **Appendix-D**	Page no. Ref no.	
3	Quality Assurance Program (As per Quality Assurance of Technical Specs Volume II)	Page no. Ref no.	
4	Detailed Project Implementation Plan (As per requirements of Technical Specs Volume II)	Page no. Ref no.	
5	Approach paper for implementation of AMI and PLM system	Page no. Ref no.	
6	Write-up along with connectivity diagram as per **Appendix –E -** Proposed Network Architecture	Page no. Ref no.	

2) A detailed project implementation plan and schedule that is consistent with the scope of the project and Employer's specified objectives. The plan shall include the activities of both the Contractor and Employer, show all key milestones, and clearly identify the nature of all information and project support to be provided by Employer.

3) A commitment and a clearly defined plan to develop a system support organization, based in India and capable of providing a full range of local services (including software and hardware maintenance and upgrade support) for the life of the delivered systems.
4) The Bidder may offer the bought-out items from more than one manufacturer. In case of QR items, the Bidder shall provide supporting qualification document also.

1.12. Table of Compliance

The Bidder shall annotate the Table of Contents of each section and appendix of Volume –II (Technical Specification of AMI & PLM system) to provide a high-level summary of compliance status. In both cases, the following symbols, and no others, shall be used:

C - Bid complies with all requirements in the adjacent paragraph.

A - Bid is not compliant with the requirements in the adjacent paragraph, but a functional alternative is proposed.

X - Bid takes exception to the requirements of the adjacent paragraph and no functional alternative is proposed.

Only one symbol shall be assigned to paragraph and shall indicate the worst case level of compliance for that paragraph. This annotation may be hand written.

Bidder shall also underline, on the compliance copy, all requirements to which exceptions have been taken (X) or to which alternatives have been proposed (A).

Each alternative shall be clearly and explicitly described. Such descriptions shall use the same paragraph numbering as the bid document sections addressed by the alternatives. All alternative descriptions shall be in one contiguous section of the Bidder's proposal, preferably in the same volume, and titled "Alternatives." A separate section titled "Exceptions" should be provided containing any discussion or explanation bidder chooses to provide concerning exceptions taken. Alternatives which do not substantially comply with the intent of the bid documents will be considered exceptions.

The Employer will assess the merits of each alternative and exception and will be the sole judge as to their acceptance.

1.13. Organization of the Technical Specification Document

Section 1 Introduction and General Requirements

Section 2 AMI System

Section 3 PLM System

Section 4 Hardware requirements

Section 5 Software requirements

Section 6 Inspection, Testing and Operational Acceptance

Section 7 Training Requirements

Section 8 Project Management and Implementation Plan

Section 9 Documentation and Deliverables

Section 10 Maintenance and Support Services

The following is a list of the Volume II Appendices:

Appendix A - General Information

Appendix B - Bill of Quantity (BoQ)

Appendix C - Data Requirement Sheets (DRS)

Appendix D - System Sizing Requirements

Appendix E - Proposed Network Architecture

Appendix F - DLMS/COSEM Protocol from DCU to MDAS

1.14. Applicable Standards

The following standards and codes shall generally be applicable to the equipment, hardware & software and works supplied under this Contract:

Specifications and codes shall be the latest version, inclusive of revisions, which are in force at the date of the contract award. Where new specifications, codes, and revisions are issued during the period of the contract, the Contractor shall attempt to comply with such, provided that no additional expenses are charged to the Employer without Employer's written consent.

In the event the Contractor offers to supply material and/or equipment in compliance to any standard other than Standards listed herein, the Contractor shall include with their proposal, full salient features of the new standard for comparison.

In case values indicated for certain parameters in the specifications are more stringent than those specified by the standards, the specification shall override the standards.

---------- End of this Section ----------

Section 2

Advanced Metering Infrastructure (AMI) System

Section 2. Advanced Metering Infrastructure (AMI) System

The main objective of AMI System is to enable two way communications between consumer premise smart meter and Meter Data Acquisition System (MDAS) which involves remote reading, monitoring & control of consumer meters and network meters, to serve as repository of record for all raw, validated and edited data.

The AMI system shall help utility to manage their resource and business process efficiently.

AMI system shall support the following:

1) Meter data read at configurable intervals
2) Time of day (TOD)/ Time of Use(TOU) metering
3) Event notification
4) Load control
5) Remote firmware upgrade
6) Integration with other utility systems like billing software, GIS mapping, consumer indexing, other smart grid applications like PLM, DR, etc.
7) Security features to prevent unauthorized access to the AMI & meter data and authentication for all AMI elements

The Bidder shall submit an approach paper describing overall architecture and operation philosophy of the proposed AMI solution and methodology for achieving different functionality specified in this document and also highlights additional features, if any.

2.1. General AMI System requirement

Smart Meter (Single phase, Three phase and CT operated meters) for consumers shall be provided based on any proven communication technology. The Contractor may use any protocol from Smart Meter to DCU. The DCU to MDAS shall use GPRS/GSM/3G communication and protocol shall be DLMS/COSEM. The Contractor may also provide router based solution provided end to end functionalities (i.e. Smart Meter to MDM) as envisaged in this technical specification is achieved. The Contractor shall ensure the proper data exchange among MDM, MDAS, DCU and Smart Meters as part of fully functional AMI system. Following core components of AMI system shall be provided:

1) Smart Meter (Single Phase, Three Phase, CT operated)
2) Data Concentrator Unit (DCU)
3) Meter Data Acquisition System (MDAS)
4) Meter Data Management System (MDM)

5) Hand Held Unit (HHU)

2.2. Smart Meters

It is mandatory that Single Phase and Three Phase whole current meters shall be BIS 13779 marked and Three Phase CT operated meter shall be BIS 14697 marked. Contractor has to furnish valid BIS certification before supply of meters.

2.2.1. Single Phase Smart Meter

TECHNICAL SPECIFICATIONS FOR WHOLE CURRENT A.C.SINGLE PHASE TWO WIRE SMART ENERGY METER OF ACCURACY CLASS 1.0 WITH TWO WAY COMMUNICATION FACILITY SUITABLE FOR ADVANCE METERING INFRASTRUCTURE (AMI), PEAK LOAD MANAGEMENT(PLM) INCLUDING DEMAND RESPONSE (DR)

- **Scope**

The specification covers the design, manufacturing, testing, supply and delivery of AC whole current 1 phase 2 wires Smart Energy Meter with bidirectional communication facility. The meter shall be suitable for Advanced metering Infrastructure (AMI), Peak Load management (PLM) including Demand Response. The meter shall communicate with Data Concentrator Unit (DCU) / MDAS over RF mesh (license free band) /PLC. In case of GPRS communication based Smart meter, in built modem for interface to MDAS shall be provided.

Basic Features of Smart Meter

- Measurement of electrical energy parameters
- Bidirectional Communication
- Integrated Load limiting switch /relay
- Tamper event detection, recording and reporting
- Power event alarm such as loss of supply, high voltage
- Remote firmware upgrade
- On demand reading

- **General Standards applicable for Meters**

Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following Indian/International Standards and all related Indian/International standards to be read with up to-date and latest amendments/revisions thereof:

Sl. No.	Standard No.	Title
1	IS 13779 with latest amendments	AC Static Watt-hour Meter class 1.0& 2.0
2	CBIP- Publication 304	Standardization of AC Static Electrical Energy Meters
3	CBIP Technical report no. 111	Specification for common Meter Reading Instrument
4	IEC-62052-11	Electricity metering equipments (AC) - General Requirements & test conditions Part 11. metering equipments
5	IS :9000	Basic Environmental Testing Procedures for Electronic & Electrical Items.
6	ANSI/IPC-A-610	Workmanship standard for Acceptability of Electronic Assemblies (A standard developed by Institute for Interconnecting and packaging Circuits)
7	IS 12063	Degrees of protection provided by enclosures of electrical equipment.
8	IS 14451, Part-2: 1999	Tele-metering for consumption and demand. Direct digital transfer of meter values.
9	IS 4905: 1999.	Methods for Random sampling.
10	IS 12346	Specifications for Testing Equipment for AC Energy meter.
11	IEC-61000-4-5	Electromagnetic capability: Testing and measurement techniques – Surge immunity test
12	IEC 62053-21	Static Meter for Active Energy (Class 1 & 2)
13	IS 15884	Alternating Current direct connected Static Prepayment Meters for Active Energy (Class 1and 2)
14	IEC 62055-31	Static payment meters for active energy (classes 1 and 2)

In case of conflict between Indian and International standards, Indian standard shall prevail.

- **Communication Feature**

Communication with Data Concentrator Unit (DCU)/MDAS - Meter shall have ability to communicate with Data Concentrator Unit (DCU) over RF mesh (license free band) /PLC in a secure manner. In case of GPRS based meter, meter should be able to communicate with the MDAS in a secure manner. The communication module should be inside the meter. Provision of limited access to utility to change only the SIM card in case of GPRS based meter. Meter should accommodate SIM card from any service provider.

- **Remote Load control facility**

Meter shall be fitted with a remotely settable relay and switch/contactor which will disconnect / limit the load and connect / restore the supply after the event. The current capacity of the relay shall be atleast equal to the maximum current capacity of the meter.

- **Applicable Standards, Climatic Conditions, Ratings, Starting Current, Supply System, Quantities To Be Measured / Monitored, Accuracy & Limits of Errors, Running at No Load, Test Output Device, Name Plate and Marking, Guarantee and Other Features**

Particulars	Specification
Applicable Standards	The meters shall comply with IS 13779 / IS 15884 for all requirements except for those parameters which have been specifically mentioned to be otherwise in this specification.
Reference Voltage	240 V (-40% to +20%) Single Phase
Current Rating	5-30 A
Starting Current	As per IS 13779
Accuracy	Class 1.0 as per IS 13779 for Active Energy
Limits of error	As per IS 13779
Operating Temperature range	As per IS 13779

Humidity	As per IS 13779
Frequency	As per IS 13779
Influence Quantities	As per IS 13779
Power Consumption of meter excluding communication module	As per IS 15884 Power consumption of communication module shall be separately measured for internal use.
Current and Voltage Circuit	As per IS 13779
Running at No Load	As per IS 13779
Test output device	As per IS 13779
Name Plate and Marking	As per IS 13779
Meter Display	Min 6 digit backlit LCD Display of minimum 8 mm height with legends to identify parameters on meter.
Parameters to be measured	Instantaneous: V, I , kW, Power factor, Cumulative - Active Energy, Current Demand in kW and kVA and signed kVAR Billing parameters: Previous month's MD in kW and kVA, kWh, kVAh & kVARh (lead/lag), Average power factor, Number of tamper count. The billing parameters shall be retained in the meter for 2 months and should automatically rollover
Power Quality Information	Logging of quality of supply events like power on/off, over/under voltage, over current (50 events) Setting of Under/Over Voltage and Over current shall be configurable.
Maximum Demand	Should have Maximum Demand registers kW and kVA with integration period 30/15 minutes. The re-setting shall be automatic at the end of every month i.e. 24 hours of last day of month or through communication command from MDAS and HHU as and when required.

Load Survey/Interval Data	35 (Power ON) days data to be recorded with 30 minutes integration period /17 days data to be recorded with 15 minutes integration period with date & time stamping for Active Energy (kWh), Apparent Energy (kVAh), Reactive Energy (kVARh), Average Voltage, Average Current, Average Power Factor and Average Demand in kW & kVA. In addition cumulative mid night kWh, kVAh, kVARh (lead/lag) (00.00 Hrs) with date & time stamp shall also be recorded for 35 (Power ON) days.
Time of Use	Should support atleast 4 Time of day tariff registers with programmable time zones and storage of billing parameters (kW, kVA, kWh).
LED/LCD Indicators	LED indicator for pulse/kWh. LED / LCD Indicator for Tamper, Disconnection.
Tamper/Event recording	A total of last 50 events considering all tampers defined must be detected and logged as tamper events on first in first out basis along with date & time of occurrence and restoration, total tamper counts with tamper identification. Snapshot of kWh, V and I shall be recorded along with the following tamper events all of which must have date and time stamp: • Meter cover open detection - First instance • Neutral disturbance • Magnetic Interference Utility shall be able to select what tamper events to be communicated back to MDAS as and when they occur. These tamper events shall be sent as an alarm to the MDAS which shall store the same in its database.
Alarm switch / contactor	Alarm for power on/off(on restoration of power), Under Voltage, Over Voltage, Over Current, Mal functioning of relay shall be generated and communicated to the MDAS immediately.
Measuring Elements	Meter should have two measuring elements - one in phase and other in neutral path.

Load Control	Meter shall be remotely settable to support. Relay for connection/disconnection: Phase Disconnection on the following conditions: • Over current • Load control limit • Pre-programmed Tamper conditions (Meter Cover open detection, Neutral disturbance, Magnetic Interference) • Disconnect signal from Utility Control Centre such as balance unavailable in case pre-paid facility is availed by consumer. Load Control limits shall be remotely programmable. The reconnection mechanism is as follows: • The switch re-connection shall be decided by meter locally. It will try to re-connect the load up to 3 times, with 5 minutes interval. • If the consumption is still more than the programmed limits, it will lock out and wait for 30 minutes (lock out period). • If the consumption is still above the limit, the procedure as defined above in i) and ii) shall be repeated. Reconnection mechanism: Reconnection shall normally be done from MDAS. In case of failure of communication, reconnection shall be possible through HHU locally and the same shall be password protected. For reconnection mechanism a local reset button shall also be provided on the Smart Meter. Local reset button shall be able to reconnect the load, if load is below the programmed load curtailment limit. There shall be provision for enabling and disabling the functioning of the local reset button by utility through MDAS or HHU through password protect access. Relay for connect/disconnect shall comply all relevant requirements of IS 15884 or any other equivalent International Standard.

Connect/Disconnect Indication	Connect/Disconnect facility to be provided on both the wires i.e. phase and neutral simultaneously. Status of Relay - indication of status of relay i.e. Connected / Disconnected should be available on display as well as through communication. Connection and Disconnection should also be logged as events.
Programmability	It should be possible to program the parameters limits / values from remote through adequate security mechanism. Once programmed it will be possible for the programmed parameters to come into effect from a certain date & time. Meteorology under such condition must remain intact and shall not be upgradable from remote.
Communication	The port for local communication and baud rate shall be as per IS 15959. In addition to this the meter will have a provision for an 'integral modular plug in type' OR 'built in type' Communication Module for NAN (Neighborhood Area Network) i.e. from Meter to Data Concentrator or directly for WAN (Wide Area Network). This Communication Module could operate on Low Power Radio / RF with Mesh/PLC / GPRS. Different communication technologies shall follow relevant National or International Standard as applicable.
Communication Protocol	Any protocol for communication between meter and DCU. Protocol details to be provided to Employer. In case of GPRS based meter, meter shall communicate with MDAS using DLMS protocol.

RTC & time synchronization	Meter shall have RTC with 20 years calendar programmed in the memory and provision for time synchronization, The maximum drift shall not exceed +/- 300 Seconds per year. The clock day/date setting and synchronization shall only be possible through password/key code command from one of the following: • Hand Held Unit(HHU) or meter testing work bench and this shall need password enabling for meter; • From remote server through suitable communication network. Contractor shall submit the methodology for the synchronization of RTC.
Data Retention	Non Volatile Memory (non-battery backed up) with 10 years data retention in absence of power.
Battery Backup	Meter shall be supplied with separate battery backup for RTC and for display in case of power failure. The battery shall have a guaranteed life of 10 years from receipt of material at store.
Guarantee	Manufacturer Shall undertake a guarantee to replace meter up to a period of 5 year from the date of operation. The meter which are found defective/inoperative at the time installation or become inoperative/defective within the guarantee period, these defective/inoperative meters shall be replaced within one month of receipt of report for such defective/inoperative meters
Remote Firmware Upgrade	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field in secure manner.

- **Data display facility (manual/Auto)**

Data Display shall have following three modes:

1. Auto Scroll
2. Scroll with Push-button
3. High Resolution (Shall display energy values with resolution of 2 digits before decimal and 3 digits after decimal in push button mode.

The display order shall be:-

- Auto Scroll
    - Cumulative Active Energy kWh along with legend.
    - Current calendar month MD in kW with legend.
    - Instantaneous voltage
    - Instantaneous current

These parameters should be displayed on the LCD continuously for a period of 15 seconds on Auto scroll. In case of power failure, the meter should display above parameters with push button**.**

- Scroll with Push-button
    - Internal diagnostics
    - Cumulative kWh
    - Date
    - Real Time
    - Voltage in (V)
    - Current (I)
    - Inst. Power kW
    - Current month MD in kW
    - Last month cumulative kWh
    - Last month MD in kW
    - Last month MD in kW occurrence Date
    - Last month MD in kW occurrence Time
    - Last month no. of tamper count
    - Meter Serial Number

The meter's display should return to default display mode (continues auto scroll) if push button is not operated for more than 10 seconds.

- **ANTI TAMPER FEATURES**

The meter shall not be affected by any remote control device and shall continue recording energy under any one or combinations of the following condition.

a) The meter shall be capable of recording energy correctly even if input and output terminals are interchanged. Also, the meter shall record correctly even if phase and neutral are inter changed.
b) The meter shall register energy even if the load is not terminated back to the meter; instead current is drawn through a local earth under following conditions.
   - When phase and neutral are connected correctly.
   - When phase and neutral wires connected are interchanged at input terminals.
c) Also when only phase is available either in neutral or phase terminal and earth loading has been done. In such circumstances only minimum starting current of 1.5 Amp. should be drawn and in other conditions as per relevant IS.
d) The meter shall be factory calibrated through software and no modification of calibration shall be possible at site by any means what-so-ever. Trim pot method for calibration shall not be acceptable. No mechanical or potentiometer like devices shall be used for meter calibration that possibly can alter the meter accuracy either in case of change in climatic conditions or intentionally at site. Calibration Certificate/Routine test certificate should be supplied with the dispatch.
e) Meter shall record the energy accurately under the effect of radiation emitted by mobile phone. The test shall be carried out by bringing a mobile phone in the close proximity almost touching the meter of the meter for 10 minutes when there is an incoming call (ringing or being received) and shall be checked under the following conditions:
   - 10% I_b and UPF
   - 50% I_b and UPF
   - I_b and UPF
   - I_b and 0.8 PF
   - 120% I_b and UPF
f) The Meter shall be immune or shall log the event of attempt of tampering by the external magnetic field with permanent magnet, occurrences & restoration with date & time to the external magnetic field. The meter shall also start recording energy at maximum current I_{MAX} under such influence of abnormal magnetic field irrespective of actual load. The meter shall record as per actual load once the external abnormal magnetic field is removed.
g) Meter shall be immune of any abnormal frequency signal OR Meter shall log & display as tamper in the event of abnormal frequency signal i.e. less than 47.5 Hz OR more than 52.5 Hz is supplied to the meter.
h) Load survey-for all the billing parameters/anti tamper features shall be available for 75 days,
i) Minimum 100 numbers of events (occurrence + restoration; occurrence & restoration will be counted as separate events with date & time and voltage ,

current & power factor if persists more than 10 minutes except ND & magnet) shall be available in the meter memory on FIFO facility. All the information shall be available in a standard simple format.

j) Meter should register energy correctly as per prevailing IS at 240V and UPF even with neutral disconnected or neutral available through by putting variable resistance/capacitor/diode.

k) The meter shall work satisfactorily under presence of various influencing conditions like External Magnetic Field, Electromagnetic Field, Radio Frequency Interference, Vibrations, harmonic Distortion, Voltage/ Frequency Fluctuations, and electromagnetic High Frequency Fields etc. The meter should be immune to electrostatic discharges (generated by High Voltage/Frequency Tamper device) of voltage up to 35 KV level (approx.). To this effect a test certificate must submitted by the bidder from NABL accredited laboratory as per following criteria.
The accuracy of the meter should not be affected with the application of abnormal voltage /frequency generating device (having spark discharge of approximately 35Kv) in any of the following manner for a total period of 10 minutes:

- On phase or neutral terminals
- On any connecting wires of the meter.
- Voltage discharge with 0-10mm spark gap
- Spark on meter body
- At any place in load circuit

The accuracy of meter should be checked before, during & after the application of said devices.

- **Tests**

Type Tests & Test Certificates

Smart meter shall be type tested for all the type tests as per IS: 13779 (latest version) in a third party NABL accredited lab. For type testing after final assembly 6 (six) Smart meters shall be selected from 1st lot of 1000 meters or ordered quantity, whichever is less Type test shall be applied to three meters; in the event of one specimen failing to comply in any respect, balance three specimens shall comply with the requirements of the IS standard. In case any meters in second set of specimen also fail, the complete lot of meters shall be rejected. The bidder/ supplier shall review the design and submit a modified design and again sample selection & type test shall be repeated as mentioned above.

For connect/disconnect relay type test certificate from NABL accredited/ renowned international lab shall be as per IS 15884 or IEC 62055-31 for UC2.

Type test certificate for communication module shall be provided as per relevant national/international standard. For RF module testing certificate for Transmitted power and Frequency as per allowable limits for free license band as notified by WIRELESS PLANNING & COORDINATION (WPC) Wing of the Ministry of Communications of India.

Routine & Acceptance Tests

The Factory Acceptance and Routine tests shall be carried out as per IS-13779. Apart from above test meter shall be also be tested for all functional requirement through communication as part of acceptance test

- **Construction**

Meter Base & Cover

The meter Base & cover shall be ultrasonically welded. The material for base and transparent cover of the meter shall be of thermo setting plastic/engineering plastic respectively.

Thermo Setting Plastic

Self-insulating, non-corroding, thermosetting material, which would ensure maximum protection against distortion and injury to working part during normal use and rough handling during transportation. The material shall not soften/melt on heating produced in normal operation of the meter.

Engineering Plastic

The meter casing material should be glass reinforced, flame retardant, unbreakable engineering plastic material to ensure high reliability, long trouble free life, safety against electric shock, spread of fire and effect or excessive temperature. The material shall be corrosion resistant & inert to chemicals, oxidizing agents, petro chemical products, acids, salts and ultraviolet radiation. The meter chamber shall be dust proof and moisture proof. The supplier should indicate hardness, melting temperature and tensile yield strength of the material and necessary test certificates of the same shall be furnished. The meter case and cover should be sturdy enough to prevent damage during transportation and installation.

The engineering plastic housing used may be provided with a key hole on the top for fixing which should not be accessible to the consumer after terminal cover is sealed. The engineering plastic used shall conform to IS 11731 besides meeting the test requirement of heat deflection test as per ISO-75 and Glow wire test as per the relevant standards.

Terminal Block & Cover

The terminals may be grouped in a terminal block having insulating properties and mechanical strength. The terminal block shall be made from best quality non-hygroscopic, flame retardant material (capable of passing the flammability tests given in IS-11731) with nickel-plated brass or aluminium alloy for connecting terminals. The clamping screw should be provided inside the terminal cover and should have metallic sleeve molded within the block to avoid damage during tightening of the screws.

The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor with the help of two screws through agency of a plate so as to made cage type arrangement. The screws shall have thread size not less than M4 and head having 4-6 mm diameter. The screw shall not have pointed ends at the end of threads. All terminals and connecting screws and washers should be of tinned/nickel plated brass material or aluminium alloy. The internal diameter of terminal hole shall be min. 8.5 mm and should comfortably accommodate the 50 Sq. mm cable conductors. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also. The terminal cover shall be engineering plastic with minimum thickness 2.5 mm and the terminal cover shall be of extended type completely covering the terminal block and fixing holes except for the provision of conductor entry at the bottom for incoming and outgoing leads. The terminal cover shall be so provided that it remains permanently connected with meter base. The supplier shall suitably design the cover so that it opens or closes like a hinged door and the ends of hinged pins shall be flattened so that it does not come out. Provision for Minimum two number utility seal(s) as the terminal cover shall be made. Supply voltage circuit is to be connected solidly from inside.

Remote connection and Disconnection Relay and Switch Cover

The remote connection and disconnection relay and switch cover shall be made of high grade engineering plastic, which should withstand spark and heat generated due to frequent connection and disconnection of switch even on over current of the order of 25 times of the maximum current.

Design

Voltage circuit, sealing arrangement, terminal block, terminal cover and nameplate etc. shall be in accordance with IS-13779 (latest version). The meter shall be compact and reliable in design, easy to transport and immune to vibration and shock involved in transportation and handling. The insulating material used in the meter should be non-hygroscopic, non- aging and of tested quality. The terminal block and meter case shall have safety against spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per the IS- 13779.

Circuitry

The meter shall have an operational indication device such as blinking LED / LCD given type indication. The following indications are mandatory.

- Power on / pulse output
- Phase available indication
- Load earthling

- Current reversal

The operation indicator should be accessible from the front. The mounting of components on the PCB (Printed Circuit Board) shall preferably be SMT (Surface Mounted Technology) type. The circuitry in the meter shall be compatible with 2 x 8 bit (or better) processor and the meter shall be based on digital measuring and sampling technique.

Fixing Arrangement

The meter shall be projection mounted type. Every meter shall have three fixing holes one at the top and two at the bottom. The top hole shall be provided with a special clip at the back of the meter so that holding screw is not accessible to the consumer after the fixing of the meters. The lower fixing screws shall be provided under the sealed terminal cover. The requisite fixing screws shall be supplied with each meter.

Sealing

Minimum 2 No. holes shall be provided for proper fixing of meter cover with 2 No. polycarbonate numbered seals, of good quality, on opposite side (one by the meter manufacturer and the other by the Utility on both opposite side). So that meter internal parts are accessible only after breaking the seals, ultrasonic welding of case/cover of the meter.

Electronic Components

The meter shall be from high accuracy and reliable Surface Mount Technology (SMT) components. The supplier should submit the details of source/agencies from whom purchase of various components of meters used by them, has been done, to the authorized representative/ team deputed for its verification by the Employer.

Meter Marking Details

The following information shall be clearly and indelibly embossed (not printed) on the cover of the meter box except Sr.No. which should be indelibly printed with inkjet printing

I. Purchase Order number and date.

II. Year and month of manufacture

III. Purchaser's Name

IV. Guarantee : Years (as specified in GTP)

V. Sign of Danger

VI. Code name of manufacturer

VII. Meter Box Sl.No

- **Packing & Transportation**

The meters shall be suitably packed for vertical/horizontal support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing. The meter shall be packed appropriately to ensure safe transportation, handling, identification and storage. All packing materials shall be environment law in force. The primary packing shall ensure protection against humidity, dust, grease and safeguard the meters performance until its installation. The secondary packing shall provide protection during transport. The packing case shall indicate “Fragile in nature” and direction of placement of box. Each packing shall indicate marking details like Manufacturer’s name, S.No. of meters, quantity etc.

Transportation

The meter should not be exposed to undue shock and mishandling during transportation. The stacking of box inside transport media should be such as to avoid their free movement. The packing should also be protected from rain and dust by transport media. The Bidder shall be responsible for any damage during transit due to inadequate or improper packing.

- **Quality Assurance Plan**

Meter shall be manufactured as per quality plan approved by the Employer.

- **Testing and Manufacturing Facilities**

The bidder shall have at least the following testing facilities to ensure accurate calibration as per IS 13779:

- Insulation resistance measurement
- Running at no load
- Starting current test
- Limits of error
- Power loss in voltage and current circuit
- Repeatability of error

- Heating test
- Effect of Magnetic field of external origin
- AC High Voltage Test
- Abnormal Voltage / Frequency device Test

- **Inspection**
  - All meters shall be duly tested and sealed by the firm at their premises prior to inspection

  - The Utility Inspecting Officer will inspect double the number of meters as per sampling plan of IS 13779 (latest version). Max. size lot of 5,000 numbers shall be considered for acceptance test as per IS 13779. Higher lot shall be considered as two or more lots. The inspecting agency can carry out any type test which felt necessary as acceptance test at firm's works. After testing, these sample meters shall be additionally sealed by the inspecting officer and one copy of the inspection report will be handed over to the manufacturer. However, one sample of each successive lot (of 5000 meters) received in the stores will be subject to all tests as per specification from any NABL lab.

  - The supplier shall submit the details of source/ agencies from whom purchase of various components of meters used by them, has been done, to the authorized representative/ team deputed by Employer for its verification.

  - The manufacturer shall be liable to pay penalty of Rs 20,000/- for each occasion at which the fake inspection call has been made. This penalty would be in addition to the expenses incurred by the Employer in deputing the Inspecting Officer for carrying out such inspection.

  In case the material offered for inspection fails in Ist inspection, the Employer will have the right to levy a penalty at 0.1 % of the order value. In case the material offered for inspection fail during the 2nd inspection, the Employer will have the right to increase the penalty to 0.25% of the order value. In case, the material offered fails during the 3rd and final inspection also, the firm will be liable for penal action including forfeiture of EMD, risk purchase, debarring/ blacklisting in future and no further opportunity for inspection would be provided to the supplier firm.

2.2.2. Three Phase Smart Meter

TECHNICAL SPECIFICATIONS FOR WHOLE CURRENT A.C. THREE PHASE FOUR WIRE SMART ENERGY METER OF ACCURACY CLASS 1.0 WITH TWO WAY COMMUNICATION FACILITY SUITABLE FOR ADVANCE METERING INFRASTRUCTURE (AMI), PEAK LOAD MANAGEMENT (PLM) INCLUDING DEMAND RESPONSE (DR)

- **Scope**

The specification covers the design, manufacturing, testing, supply and delivery of AC whole current 3 phase 4 wires Smart Energy Meter with bidirectional communication facility. The meter shall be suitable for Advanced metering Infrastructure (AMI), Peak Load management (PLM) including Demand Response. The meter shall communicate with Data Concentrator Unit (DCU) / MDAS over RF mesh (license free band) / PLC. In case of GPRS communication based Smart meter, in built modem for interface to MDAS shall be provided.

Basic Features of Smart Meter:

- Measurement of electrical energy parameters
- Bidirectional Communication
- Integrated Load limiting switch /relay
- Tamper event detection, recording and reporting
- Power event alarm such as loss of supply, Low /High voltage
- Remote firmware upgrade
- On demand reading

- **General Standards applicable for Meters**

Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following Indian/International Standards and all related Indian/International standards to be read with up to-date and latest amendments/revisions thereof:

Sl. No.	Standard No.	Title
1	IS 13779 with latest amendments	AC Static Watt-hour Meter class 1.0 & 2.0
2	CBIP- Publication 304	Standardization of AC Static Electrical Energy Meters

Sl. No.	Standard No.	Title
3	CBIP Technical report no. 111	Specification for common Meter Reading Instrument
4	IEC-62052-11	Electricity metering equipments (AC) - General Requirements & test conditions Part 11. metering equipments
5	IS :9000	Basic Environmental Testing Procedures for Electronic & Electrical Items.
6	ANSI/IPC-A- 610	Workmanship standard for Acceptability of Electronic Assemblies (A standard developed by Institute for Interconnecting and packaging Circuits)
7	IS 12063	Degrees of protection provided by enclosures of electrical equipment.
8	IS 14451, Part-2: 1999	Tele-metering for consumption and demand. Direct digital transfer of meter values.
9	IS 4905: 1999	Methods for Random sampling.
10	IS 12346	Specifications for Testing Equipment for AC Energy meter.
11	IEC-61000-4-5	Electromagnetic capability: Testing and measurement techniques – Surge immunity test
12	IEC 62053-21	Static Meter for Active Energy (Class 1&2)
13	IS 15884	Alternating Current direct connected Static Prepayment Meters for Active Energy (Class 1 and 2)
14	IEC 62055-31	Static payment meters for active energy (classes 1 and 2)

In case of conflict between Indian and International standards, Indian standard shall prevail.

- **Communication Feature**

Communication with Data Concentrator Unit (DCU)/ MDAS- Meter shall have ability to communicate with Data Concentrator Unit (DCU) over RF mesh (license free band) /PLC in a

secure manner. In case of GPRS based meter, meter should be able to communicate with the MDAS in a secure manner. The communication module should be inside the meter. Provision of limited access (utility seal shall be provided at SIM slot) to utility to change only the SIM card in case of GPRS based meter. Meter should accommodate SIM card from any service provider.

- **Remote Load Control Facility**

Meter shall be fitted with a remotely settable relay and switch/contactor which will disconnect / limit the load and connect / restore the supply after the event. The current capacity of the relay shall be atleast equal to the maximum current capacity of the meter.

- **Applicable Standards, Climatic Conditions, Ratings, Starting Current, Supply System, Quantities to be Measured / Monitored, Accuracy & Limits of Errors, Running at No Load, Test Output Device, Name Plate and Marking, Guarantee and Other Features**

Particulars	Specification
Applicable Standards	The meters shall comply with IS 13779 /IS15884 for all requirements except for those parameters which have been specifically mentioned to be otherwise in this specification.
Reference Voltage	3x240 V phase to neutral
Current Rating	10-60A
Starting Current	As per IS 13779
Accuracy	Class 1.0 as per IS 13779 for Active Energy
Limits of error	As per IS 13779
Operating Temperature range	As per IS 13779
Humidity	As per IS 13779
Frequency	As per IS 13779
Influence Quantities	As per IS 13779

Power Consumption of meter excluding communication module/ connect/disconnect switch	As per IS 15884 Power consumption of communication module shall be separately measured for internal use.
Current and pressure Coil	As per IS 13779
Running at No Load	As per IS 13779
Test output device	As per IS 13779
Name Plate and Marking	As per IS 13779
Meter Display	Min 6 digit backlit LCD Display of minimum 8 mm height with legends to identify parameters on meter.
Parameters to be measured	Instantaneous : VRN VBN, VYN, IR, IY IB , kW, Power factor, Cumulative - Active Energy, Current Demand in kW, kVA and signed kVAR Billing parameters: Previous month's MD in kW and kVA, kWh, kVAh & kVARh (lead/lag), Average power factor, Number of tamper count. The billing parameters shall be retained in the meter for 2 months and should automatically rollover.
Power Quality Information	Logging of quality of supply events like power on/off, over/under voltage, over current (50 events) Setting of Under/Over Voltage and Over current shall be configurable.
Maximum Demand	Should have Maximum Demand registers kW and kVA with integration period 30/15 minutes. The re-setting shall be automatic at the end of every month i.e. 24 hours of last day of month or through communication command from MDAS and HHU as and when required.

Load Survey/Interval Data	35 (Power ON) days data to be recorded with 30 minutes integration period /17 days data to be recorded with 15 minutes integration period with date & time stamping for Active Energy (kWh), Apparent Energy (kVAh), Reactive Energy (kVARh), Average Voltage, Average Current, Average Power Factor and Average Demand in kW & kVA. In addition cumulative mid night kWh, kVAh, kVARh (lead/lag) (00.00 Hrs) with date & time stamp shall also be recorded for 35 (Power ON) days.
Time of Use	Should support atleast 4 Time of day tariff registers with programmable time zones and storage of billing parameters (kW, kVA, kWh, kVAh)
LED/LCD Indicators	LED indicator for pulse/kWh. LED / LCD Indicator for Tamper, Disconnection.
Tamper/Event recording	A total of last 50 events considering all tampers defined must be detected and logged as tamper events on first in first out basis along with date & time of occurrence and restoration, total tamper counts with tamper identification. Snapshot of kWh, kVAh, Voltage (all 3 ph) and I Current (all 3 ph) shall be recorded along with the following tamper events all of which must have date and time stamp: • Meter Cover open detection - First instance • Neutral disturbance • Magnetic Interference • Potential Missing • Current Circuit Reversal • Current Circuit Short Utility shall be able to select what tamper events to be communicated back to HES as and when they occur. These tamper events shall be sent as an alarm to the HES which shall store the same in its database.
Alarm switch / contactor	Alarm for power on/off(on restoration of power), Under Voltage, Over Voltage, Over Current, Mal functioning of relay shall be generated and communicated to the HES immediately.

Measuring Elements	Meter should have four measuring elements - three in phases and one in neutral path.
Load Control	Meter shall be remotely settable to support Relay for connection/disconnection: Phase Disconnection on the following conditions: • Over current • Load Control Limit • Pre-programmed Tamper conditions (Meter Cover open detection, Neutral disturbance, Magnetic Interference) • Disconnect signal from Utility Control Centre such as balance unavailable in case pre-paid facility is availed by consumer. Load Control limits shall be remotely programmable. • The switch re-connection shall be decided by meter locally. It will try to re-connect the load up to 3 times, with 5 minutes interval. • If the consumption is still more than the programmed limits, it will lock out and wait for 30 minutes (lock out period). • If the consumption is still above the limit, the procedure as defined above in i) and ii) shall be repeated. **Reconnection mechanism:** Reconnection shall normally be done from MDAS/HES. In case of failure of communication, reconnection shall be possible through HHU locally and the same shall be password protected. For reconnection mechanism a local reset button shall also be provided on the Smart Meter. Local reset button shall be able to reconnect the load, if load is below the programmed load curtailment limit. There shall be provision for enabling and disabling the functioning of the local reset button by utility through MDAS or HHU through password protect access.

Connect/Disconnect Indication	Connect/Disconnect facility to be provided on all 3 phases. Status of Relay - indication of status of relay i.e. Connected / Disconnected should be available on display as well as through communication. Connection and Disconnection should also be logged as events.
Programmability	It should be possible to program the parameters limits /values from remote through adequate security mechanism. Once programmed it will be possible for the programmed parameters to come into effect from a certain date & time. Meteorology under such condition must remain intact and shall not be upgradable from remote.
Communication	The port for local communication and baud rate shall be as per IS 15959. In addition to this the meter will have a provision for an 'integral modular plug in type' OR 'built in type' Communication Module for NAN (Neighbourhood Area Network) i.e. from Meter to Data Concentrator or directly for WAN (Wide Area Network). This Communication Module could operate on Low Power Radio / RF with Mesh/PLC / GPRS. Different communication technologies shall follow relevant National or International Standard as applicable.
Communication Protocol	Any protocol for communication between meter and DCU. Protocol details to be provided to Employer. In case of GPRS based meter, meter shall communicate with MDAS using DLMS protocol.
RTC & time synchronization	Meter shall have RTC with 20 years calendar programmed in the memory and provision for time synchronization, The maximum drift shall not exceed +/- 300 Seconds per year. The clock day/date setting and synchronization shall only be possible through password/key code command from one of the following: • Hand Held Unit(HHU) or meter testing work bench and this shall need password enabling for meter; • From remote server through suitable communication network. Contractor shall submit the methodology for the synchronization of RTC.

Data Retention	Non Volatile Memory (non-battery backed up) with 10 years data retention in absence of power.
Battery Backup	Meter shall be supplied with separate battery backup for RTC and for display in case of power failure. The battery shall have a guaranteed life of 10 years from receipt of material at store.
Guarantee	Manufacturer Shall undertake a guarantee to replace meter up to a period of 5 year from the date of operation. The meter which are found defective/inoperative at the time installation or become inoperative/defective within the guarantee period, these defective/inoperative meters shall be replaced within one month of receipt of report for such defective/inoperative meters
Remote Firmware Upgrade	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field in secure manner.

- **Data display facility (manual/Auto)**

Data Display shall have following three modes:

1. Auto Scroll
2. Scroll with Push-button
3. High Resolution (Shall display energy values with resolution of 2 digits before decimal and 3 digits after decimal in push button mode.

The display order shall be:-

- Auto Scroll
    - Cumulative Active Energy kWh along with legend.
    - Current calendar MD in kW along with legend.
    - Cumulative Max Demand along with legend.
    - No of reset count along with legend.

These parameters should be displayed on the LCD continuously for a period of 15 seconds on Auto scroll. In case of power failure, the meter should display above parameters with push button**.**

- Scroll with Push-button
  - Internal diagnostics
  - Cumulative kWh
  - Date
  - Real Time
  - Current month MD in kW
  - Voltage phase wise
  - Current phase wise
  - Inst. Power
  - Cumulative Max Demand
  - MDI reset count
  - Last month MD in kW
  - Last month MD in kW occurrence Date
  - Last month MD in kW occurrence Time
  - Last month no. of tamper count
  - Meter Serial Number

The meter's display should return to default display mode (continues auto scroll) if push button is not operated for more than 10 seconds.

- **Anti Tamper Features**

  The meter shall not be affected by any remote control device and shall continue recording energy under any one or combinations of the following condition.

  a) The meter shall record correctly irrespective of phase sequence and even in case of current reversal and missing potential or Meter should record as per prevailing electric connection.
  Meter should not record forward energy under unbalance capacitive load condition only. Further, Meter should not log current reversal event under this condition.

  b) The meter shall continue record energy;
     - In the event neutral to the meter is disconnected from both ends of the meter and any phase is shorted to the neutral and supply is used with earth from any phase, meter should record energy at Vref, Actual Current and UPF on all phases only and log such event with date and time. The Error shall be

within ±3%. When all 3 phases remained connected at their respective places.
- Meter must function accurately, on all the phases individually when single phase load is used with earth and neutral to the meter is disconnected at the neutral point of the meter remaining phases are connected at respective places under balance voltage condition.
- The meter shall keep working even in the presence of any two wires, i.e. shall record consumption at Vref, actual current and UPF in absence of neutral and any one phase or any two phases. The Error shall be within ±3%.

c) The meter shall be factory calibrated.
d) In the meters original software, there shall be no possibility of tampering including viruses.
e) Meter shall record the energy accurately under the effect of radiation emitted by mobile phone. The test shall be carried out by bringing a mobile phone in the close proximity **(**almost touching the meter) of the meter for 10 minutes when there is an incoming call (ringing or being received) and shall be checked under the following condition:
   - 10% I_b and UPF
   - 50% I_b and UPF
   - I_b and UPF
   - I_b and 0.8 PF
   - 120% I_b and UPF
f) The Meter shall be immune or shall log the event of attempt of tampering by the external magnetic field with permanent magnet, occurrences & restoration with date & time to the external magnetic field. The meter shall also start recording energy at maximum current I_{MAX} under such influence of abnormal magnetic field irrespective of actual load. The meter shall record as per actual load once the external abnormal magnetic field is removed.
g) Meter shall log & display tampers of:
   - Potential Missing
   - Current circuit reversal
   - Current circuit short
   - Injecting AC/DC high frequency/Current signal in neutral.
h) Meter shall be immune of any abnormal frequency signal OR Meter shall log & display at tamper in the event abnormal frequency signal i.e. less than 47.5Hz OR more than 52.5 Hz is supplied to the meter.
i) Load Survey-Load survey for all the billing parameters/Anti Tamper Features should be available for 120 days.
j) Minimum 200 number of events (occurrences + restoration; occurrence & restoration will be counted as separate events with date & time and voltage, current & power factor of more than 10 minutes except Magnet , ND & Cover open) shall be available in the meter memory on roll over facility. All the information shall be available in a standard simple format.

k) Meter should register energy correctly as per prevailing IS at 240V and UPF even with neutral disconnected **or** neutral available through by putting variable resistance/capacitor/diode.

l) The meter shall work satisfactorily under presence of various influences conditions like External Magnetic Field, Electromagnetic Field, Radio Frequency Interference, Vibrations, harmonic Distortion, Voltage/Frequency Fluctuations, and electromagnetic High Frequency Fields etc. The meter should be immune to electrostatic discharges (generated by High Voltage/Frequency Tamper device) of voltage up to 35 KV level (approx.).
To this effect a test certificate must submitted by the bidder from NABL accredited laboratory as per following criteria:

The accuracy of the meter should not be affected with the application of abnormal voltage / frequency generating device (having spark discharge of approximately 35kV) in any of the following manner for a total period of 10 minutes:

- On phase or neutral terminals
- On any connecting wires of the meter
- Voltage discharge with 0-10mm spark gap
- Spark on meter body
- At any place in load circuit

The accuracy of meter should be checked before, during & after the application of said devices and the accuracy of meter should not be affected.

- **Tests**

Type Tests & Test Certificates

Smart meter shall be type tested for all the type tests as per IS: 13779 (latest version) in a third party NABL accredited lab. For type testing after final assembly 6 (six) Smart meters shall be selected from 1st lot of 1000 meters or ordered quantity, whichever is less Type test shall be applied to three meters; in the event of one specimen failing to comply in any respect, balance three specimens shall comply with the requirements of the IS standard. In case any meters in second set of specimen also fail, the complete lot of meters shall be rejected. The bidder/ supplier shall review the design and submit a modified design and again sample selection & type test shall be repeated as mentioned above.

For connect/disconnect relay type test certificate from NABL accredited/ renowned international lab shall be as per IS 15884 or IEC 62055-31 for UC2

Type test certificate for communication module shall be provided as per relevant national/international standard. For RF module testing certificate for Transmitted power and Frequency as per allowable limits for free license band as notified by WIRELESS PLANNING & COORDINATION (WPC) Wing of the Ministry of Communications of India.

Routine & Acceptance Tests

The Factory Acceptance and Routine tests shall be carried out as per IS-13779. Apart from above test meter shall be also be tested for all functional requirement through communication as part of acceptance test

- **Construction**

Meter Base & Cover

The meter Base & cover shall be ultrasonically welded. The material for base and transparent cover of the meter shall be of thermo setting plastic/engineering plastic respectively.

Thermo Setting Plastic

Self-insulating, non-corroding, thermosetting material which would ensure maximum protection against distortion and injury to working part during normal use and rough handling during transportation. The material shall not soften/melt on heating produced in normal operation of the meter.

Engineering Plastic

The meter casing material should be glass reinforced, flame retardant, unbreakable engineering plastic material to ensure high reliability, long trouble free life, safety against electric shock, spread of fire and effect or excessive temperature. The material shall be corrosion resistant & inert to chemicals, oxidizing agents, petro chemical products, acids, salts and ultraviolet radiation. The meter chamber shall be dust proof and moisture proof. The supplier should indicate hardness, melting temperature and tensile yield strength of the material and necessary test certificates of the same shall be furnished. The meter case and cover should be sturdy enough to prevent damage during transportation and installation.

The engineering plastic housing used may be provided with a key hole on the top for fixing which should not be accessible to the consumer after terminal cover is sealed. The engineering plastic used shall conform to IS 11731 besides meeting the test requirement of heat deflection test as per ISO-75 and Glow wire test as per the relevant standards.

Terminal Block & Cover

The terminals may be grouped in a terminal block having insulating properties and mechanical strength. The terminal block shall be made from best quality non-hygroscopic, flame retardant material (capable of passing the flammability tests given in IS-11731) with nickel-plated brass or aluminium alloy for connecting terminals. The clamping screw should

be provided inside the terminal cover and should have metallic sleeve molded within the block to avoid damage during tightening of the screws.

The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor with the help of two screws through agency of a plate so as to made cage type arrangement. The screws shall have thread size not less than M4 and head having 4-6 mm diameter. The screw shall not have pointed ends at the end of threads. All terminals and connecting screws and washers should be of tinned/nickel plated brass material or aluminium alloy. The internal diameter of terminal hole shall be min. 8.5 mm and should comfortably accommodate the 50 Sq. mm cable conductors. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also. The terminal cover shall be engineering plastic with minimum thickness 2.5 mm and the terminal cover shall be of extended type completely covering the terminal block and fixing holes except for the provision of conductor entry at the bottom for incoming and outgoing leads. The terminal cover shall be so provided that it remains permanently connected with meter base. The supplier shall suitably design the cover so that it opens or closes like a hinged door and the ends of hinged pins shall be flattened so that it does not come out. Provision for Minimum two number utility seal(s) as the terminal cover shall be made. Supply voltage circuit is to be connected solidly from inside.

Remote Connection and Disconnection Relay and Switch Cover

The remote connection and disconnection relay and switch cover shall be made of high grade engineering plastic, which should withstand spark and heat generated due to frequent connection and disconnection of switch even on over current of the order of 25 times of the maximum current.

Design

Voltage circuit, sealing arrangement, terminal block, terminal cover and nameplate etc. shall be in accordance with IS-13779 (latest version). The meter shall be compact and reliable in design, easy to transport and immune to vibration and shock involved in transportation and handling. The insulating material used in the meter should be non-hygroscopic, non- aging and of tested quality. The terminal block and meter case shall have safety against spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per the IS- 13779.

Circuitry

The meter shall have an operational indication device such as blinking LED / LCD given type indication. The following indications are mandatory.

- Power on / pulse output
- Phase available indication
- Load earthling
- Current reversal

The operation indicator should be accessible from the front. The mounting of components on the PCB (Printed Circuit Board) shall preferably be SMT (Surface Mounted Technology) type. The circuitry in the meter shall be compatible with 2 x 8 bit (or better) processor and the meter shall be based on digital measuring and sampling technique.

Fixing Arrangement

The meter shall be projection mounted type. Every meter shall have three fixing holes one at the top and two at the bottom. The top hole shall be provided with a special clip at the back of the meter so that holding screw is not accessible to the consumer after the fixing of the meters. The lower fixing screws shall be provided under the sealed terminal cover. The requisite fixing screws shall be supplied with each meter.

Sealing

Minimum 2 No. holes shall be provided for proper fixing of meter cover with 2 No. polycarbonate numbered seals, of good quality, on opposite side (one by the meter manufacturer and the other by the Utility on both opposite side). So that meter internal parts are accessible only after breaking the seals, ultrasonic welding of case/cover of the meter.

Electronic Components

The meter shall be from high accuracy and reliable Surface Mount Technology (SMT) components. The supplier should submit the details of source/agencies from whom purchase of various components of meters used by them, has been done, to the authorized representative/ team deputed for its verification by the Employer.

- **Packing & Transportation**

The meters shall be suitably packed for vertical/horizontal support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing. The meter shall be packed appropriately to ensure safe transportation, handling, identification and storage. All packing materials shall be environment law in force. The primary packing shall ensure protection against humidity, dust, grease and safeguard the meters performance until its installation. The secondary packing shall provide protection during transport. The packing case shall indicate “Fragile in

nature" and direction of placement of box. Each packing shall indicate marking details like Manufacturer's name, S.No. of meters, quantity etc.

Transportation

The meter should not be exposed to undue shock and mishandling during transportation. The stacking of box inside transport media should be such as to avoid their free movement. The packing should also be protected from rain and dust by transport media. The Bidder shall be responsible for any damage during transit due to inadequate or improper packing.

- **Quality Assurance Plan**

Meter shall be manufactured as per quality Plan approved by the Employer.

- **Testing and Manufacturing Facilities**

The bidder shall have at least the following testing facilities to ensure accurate calibration as per IS13779:

- Insulation resistance measurement.
- Running at no load.
- Starting current test.
- Limits of error.
- Power loss in voltage and current circuit.
- Repeatability of error.
- Heating test.
- Effect of Magnetic field of external origin.
- AC High Voltage Test
- Abnormal Voltage / Frequency device Test

- **Inspection**
  - All meters shall be duly tested and sealed by the firm at their premises prior to inspection.
  - The Employer Inspecting Officer will inspect double the number of meters as per sampling plan of IS 13779 (latest version). Max. size lot of 5,000 numbers shall be considered for acceptance test as per IS 13779. Higher lot shall be considered as two or more lots. The inspecting agency can carry out any type test which felt necessary as acceptance test at firm's works. After testing, these sample meters shall be additionally sealed by the inspecting officer and one copy of the inspection report will be handed over to the manufacturer. However, one sample of each successive lot (of

5000 meters) received in the stores will be subject to all tests as per specification from any NABL lab.

- The supplier shall submit the details of source/ agencies from whom purchase of various components of meters used by them, has been done, to the authorized representative/ team deputed by Employer for its verification.
- The manufacturer shall be liable to pay penalty of Rs 20,000/- for each occasion at which the fake inspection call has been made. This penalty would be in addition to the expenses incurred by the Employer in deputing the Inspecting Officer for carrying out such inspection.

In case the material offered for inspection fails in Ist inspection, the Employer will have the right to levy a penalty at 0.1 % of the order value. In case the material offered for inspection fail during the 2nd inspection, the Employer will have the right to increase the penalty to 0.25% of the order value. In case, the material offered fails during the 3rd and final inspection also, the firm will be liable for penal action including forfeiture of EMD, risk purchase, debarring/ blacklisting in future and no further opportunity for inspection would be provided to the supplier firm.

2.2.3. Three Phase CT operated Meter

TECHNICAL SPECIFICATIONS FOR CT OPERATED A.C. THREE PHASE FOUR WIRE SMART ENERGY METER OF ACCURACY CLASS 0.5 WITH TWO WAY COMMUNICATION FACILITY SUITABLE FOR ADVANCE METERING INFRASTRUCTURE (AMI)

- **Scope**

The specification covers the design, manufacturing, testing, supply and delivery of AC CT operated 3 phase 4 wires Smart Energy Meter with bidirectional communication facility. The meter shall be suitable for Advanced metering Infrastructure (AMI). The meter shall communicate MDAS over GPRS communication and GPRS modem shall be built.

Basic Features of Smart Meter:

- Measurement of electrical energy parameters
- Bidirectional Communication
- Tamper event detection, recording and reporting
- Power event alarm such as loss of supply, Low /High voltage
- Remote firmware upgrade
- On demand reading

- **General Standards Applicable for Meters**

Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following Indian/International Standards and all related Indian/International standards to be read with up to-date and latest amendments/revisions thereof:

Sl. No.	Standard No.	Title
1	IS 14697 with latest amendments	AC Static Transformer Operated Watt-hour and VAR-Hour Meters, class 0.2S and 0.5S
2	CBIP- Publication 304	Standardization of AC Static Electrical Energy Meters
3	CBIP Technical report no. 111	Specification for common Meter Reading

Sl. No.	Standard No.	Title
		Instrument
4	IEC-62052-11-	Electricity metering equipments (AC) - General Requirements & test conditions Part 11. metering equipments
5	IS :9000	Basic Environmental Testing Procedures for Electronic & Electrical Items.
6	ANSI/IPC-A- 610	Workmanship standard for Acceptability of Electronic Assemblies (A standard developed by Institute for Interconnecting and packaging Circuits)
7	IS 12063	Degrees of protection provided by enclosures of electrical equipment.
8	IS 14451, Part-2: 1999	Telemetering for consumption and demand. Direct digital transfer of meter values.
9	IS 4905: 1999	Methods for Random sampling.
10	IS 12346	Specifications for Testing Equipment for AC Energy meter.
11	IEC-61000-4-5	Electromagnetic capability: Testing and measurement techniques – Surge immunity test
12	IEC 60687	AC Static Transformer Operated Watt-hour and VAR-Hour Meters, class 0.2S and 0.5S

In case of conflict between Indian and International standards, Indian standard shall prevail.

- **Communication Feature**

Communication with Meter Data Acquisition System- Meter shall have ability to communicate with the MDAS over GPRS in a secure manner. The communication module should be inside the meter. Provision of limited access (utility seal shall be provided at SIM slot) to utility to change only the SIM card in meter. Meter should accommodate SIM card from any service provider.

- **Applicable Standards, Climatic Conditions, Ratings, Starting Current, Supply System, Quantities to be Measured / Monitored, Accuracy & Limits of Errors, Running at No Load, Test Output Device, Name Plate and Marking, Guarantee and**

Other Features.

Particulars	Specification
Applicable Standards	The meters shall comply with IS 14697 for all requirements except for those parameters which have been specifically mentioned to be otherwise in this specification.
Reference Voltage	3x240V phase to neutral
Current Rating	Primary Current-/5A
Starting Current	As per IS 14697
Accuracy	Class 0.5 as per IS 14697
Limits of error	As per IS 14697
Operating Temperature range	As per IS 14697
Humidity	As per IS 14697
Frequency	As per IS 14697
Influence Quantities	As per IS 14697
Power Consumption of meter excluding communication module	As per IS 14697 Power consumption of communication module shall be separately measured for internal use.
Current and pressure Coil	As per IS 14697
Running at No Load	As per IS 14697
Test output device	As per IS 14697
Name Plate and Marking	As per IS 14697
Meter Display	Min 6 digit backlit LCD Display of minimum 8 mm height with legends to identify parameters on meter.
Parameters to be measured	Instantaneous : VRN VBN, VYN, IR, IY IB , kW, Power factor, Cumulative - Active Energy, Current Demand in kW, kVA and signed kVAR Billing parameters: Previous month's MD in kW and kVA, kWh, kVAh & kVARh (lead/lag), Average power factor, Number of

Particulars	Specification
	tamper count. The billing parameters shall be retained in the meter for 2 months.
Power Quality Information	Logging of quality of supply events like power on/off, over/under voltage, over current (50 events) Setting of Under/Over Voltage and Over current shall be configurable.
Maximum Demand	Should have Maximum Demand registers kW and kVA with integration period 30/15 minutes. The re-setting shall be automatic at the end of every month i.e. 24 hours of last day of month or through communication command from MDAS and HHU as and when required.
Load Survey/Interval Data	35 (Power ON) days data to be recorded with 30 minutes integration period /17 days data to be recorded with 15 minutes integration period with date & time stamping for Active Energy (kWh), Apparent Energy (kVAh), Reactive Energy (kVARh), Average Voltage, Average Current, Average Power Factor and Average Demand in kW & kVA. In addition cumulative mid night kWh, kVAh, kVARh (lead/lag) (00.00 Hrs) with date & time stamp shall also be recorded for 35 (Power ON) days.
Time of Use	Should support atleast 4 Time of day tariff registers with programmable time zones and storage of billing parameters (kW, kVA, kWh, kVAh)
LED/LCD Indicators	LED indicator for pulse/kWh. LED / LCD Indicator for Tamper, Disconnection.
Tamper/Event recording	A total of last 50 events considering all tampers defined must be detected and logged as tamper events on first in first out basis along with date & time of occurrence and restoration, total tamper counts with tamper identification. Snapshot of kWh, kVAh, Voltage (all 3 ph) and I Current (all 3 ph) shall be recorded along with the following tamper events all of which must have date and time stamp: • Meter Cover open detection - First instance • Neutral disturbance • Magnetic Interference • Potential Missing • Current Circuit Reversal

Particulars	Specification
	• Current Circuit Short Utility shall be able to select what tamper events to be communicated back to MDAS as and when they occur. These tamper events shall be sent as an alarm to the MDAS which shall store the same in its database.
Alarm switch/contactor	Alarm for power on/off, Under Voltage, Over Voltage, Over Current, malfunctioning of diagnostic events shall be generated and communicated to the MDAS immediately.
Measuring Elements	Meter should have four measuring elements - three in phases and one in neutral path.
Programmability	It should be possible to program the parameters limits /values from remote through adequate security mechanism. Once programmed it will be possible for the programmed parameters to come into effect from a certain date & time. Meteorology under such condition must remain intact and shall not be upgradable from remote.
Communication	The port for local communication and baud rate shall be as per IS 15959. Communication module shall be provided in the smart meter.
Communication Protocol	For GPRS/GSM based meter: as per IS 15959/DLMS-COSEM For other meter: Any protocol (Protocol details to be provided to employer)
RTC & time synchronization	Meter shall have RTC with 20 years calendar programmed in the memory and provision for time synchronization, The maximum drift shall not exceed +/- 300 Seconds per year. The clock day/date setting and synchronization shall only be possible through password/key code command from one of the following: • Hand Held Unit (HHU) or Meter testing work bench and this shall need password enabling for meter. • From remote server through suitable communication network.

Particulars	Specification
	Contractor Shall submit the methodology for the synchronization of RTC.
Data Retention	Non Volatile Memory (non-battery backed up) with 10 years data retention in absence of power.
Battery Backup	Meter shall be supplied with separate battery backup for RTC and for display in case of power failure. The battery shall have a guaranteed life of 10 years from receipt of material at store.
Guarantee	Manufacturer Shall undertake a guarantee to replace meter up to a period of 5 year from the date of operation. The meter which are found defective/inoperative at the time installation or become inoperative/defective within the guarantee period, these defective/inoperative meters shall be replaced within one month of receipt of report for such defective/inoperative meters
Remote Firmware Upgrade	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field in secure manner.

- **Data display facility (manual/Auto)**

Data Display shall have following three modes:

1. Auto Scroll
2. Scroll with Push-button
3. High Resolution (Shall display energy values with resolution of 2 digits before decimal and 3 digits after decimal in push button mode.

The display order shall be:-

- Auto Scroll
    - Cumulative Active Energy kWh along with legend.
    - Current calendar MD in kW along with legend.
    - Cumulative Max Demand along with legend.
    - No of reset count along with legend.

These parameters should be displayed on the LCD continuously for a period of 15 seconds on Auto scroll. In case of power failure, the meter should display above parameters with push button**.**

- Scroll with Push-button
  - Internal diagnostics
  - Cumulative kWh
  - Date
  - Real Time
  - Current month MD in kW
  - Voltage phase wise
  - Current phase wise
  - Inst. Power
  - Cumulative Max Demand
  - MDI reset count
  - Last month MD in kW
  - Last month MD in kW occurrence Date
  - Last month MD in kW occurrence Time
  - Last month no. of tamper count
  - Meter Serial Number

The meter's display should return to default display mode (continues auto scroll) if push button is not operated for more than 10 seconds.

- **Anti Tamper Features**

  The meter shall not be affected by any remote control device and shall continue recording energy under any one or combinations of the following condition.

  a) The meter shall record correctly irrespective of phase sequence and even in case of current reversal and missing potential or Meter should record as per prevailing electric connection.
  Meter should not record forward energy under unbalance capacitive load condition only. Further, meter should not log current reversal event under this condition.

  b) The meter shall continue record energy;

- In the event neutral to the meter is disconnected from both ends of the meter and any phase is shorted to the neutral and supply is used with earth from any phase, meter should record energy at Vref, Actual Current and UPF on all phases only and log such event with date and time. The Error shall be within ±3%. When all 3 phases remained connected at their respective places.
- Meter must function accurately, on all the phases individually when single phase load is used with earth and neutral to the meter is disconnected at the neutral point of the meter remaining phases are connected at respective places under balance voltage condition.
- The meter shall keep working even in the presence of any two wires, i.e. shall record consumption at Vref, actual current and UPF in absence of neutral and any one phase or any two phases. The Error shall be within ±3%.

c) The meter shall be factory calibrated.
d) In the meters original software, there shall be no possibility of tampering including viruses.
e) Meter shall record the energy accurately under the effect of radiation emitted by mobile phone. The test shall be carried out by bringing a mobile phone in the close proximity **(**almost touching the meter) of the meter for 10 minutes when there is an incoming call (ringing or being received) and shall be checked under the following condition:
   - 10% I_b and UPF
   - 50% I_b and UPF
   - I_b and UPF
   - I_b and 0.8 PF
   - 120% I_b and UPF
f) The Meter shall be immune or shall log the event of attempt of tampering by the external magnetic field with permanent magnet, occurrences & restoration with date & time to the external magnetic field. The meter shall also start recording energy at maximum current I_{MAX} under such influence of abnormal magnetic field irrespective of actual load. The meter shall record as per actual load once the external abnormal magnetic field is removed.
g) Meter shall log & display tampers of:
   - Potential Missing
   - Current circuit reversal
   - Current circuit short
   - Injecting AC/DC high frequency/Current signal in neutral.
h) Meter shall be immune of any abnormal frequency signal OR Meter shall log & display at tamper in the event abnormal frequency signal i.e. less than 47.5Hz OR more than 52.5 Hz is supplied to the meter.
i) Load Survey-Load survey for all the billing parameters/Anti Tamper Features should be available for 120 days.
j) Minimum 200 number of events (occurrences + restoration; occurrence & restoration will be counted as separate events with date & time and voltage, current & power factor of more than 10 minutes except Magnet , ND & Cover

open) shall be available in the meter memory on roll over facility. All the information shall be available in a standard simple format.

k) Meter should register energy correctly as per prevailing IS at 240V and UPF even with neutral disconnected **or** neutral available through by putting variable resistance/capacitor/diode.

l) The meter shall work satisfactorily under presence of various influences conditions like External Magnetic Field, Electromagnetic Field, Radio Frequency Interference, Vibrations, harmonic Distortion, Voltage/Frequency Fluctuations, and electromagnetic High Frequency Fields etc. The meter should be immune to electrostatic discharges (generated by High Voltage/Frequency Tamper device) of voltage up to 35 KV level (approx.).
To this effect a test certificate must submitted by the bidder from NABL accredited laboratory as per following criteria:

The accuracy of the meter should not be affected with the application of abnormal voltage / frequency generating device (having spark discharge of approximately 35kV) in any of the following manner for a total period of 10 minutes:

- On phase or neutral terminals
- On any connecting wires of the meter
- Voltage discharge with 0-10mm spark gap
- Spark on meter body
- At any place in load circuit

The accuracy of meter should be checked before, during & after the application of said devices and the accuracy of meter should not be affected.

- **Tests**

Type Tests & Test Certificates

Smart meter shall be type tested for all the type tests as per IS: 14697 (latest version) in a third party NABL accredited lab. For type testing after final assembly 6 (six) Smart meters shall be selected from 1st lot of 1000 meters or ordered quantity, whichever is less Type test shall be applied to three meters; in the event of one specimen failing to comply in any respect, balance three specimens shall comply with the requirements of the IS standard. In case any meters in second set of specimen also fail, the complete lot of meters shall be rejected. The bidder/ supplier shall review the design and submit a modified design and again sample selection & type test shall be repeated as mentioned above.

Type test certificate for communication module shall be provided as per relevant national/international standard.

Routine & Acceptance Tests

The Factory Acceptance and Routine tests shall be carried out as per IS-14697. Apart from above test meter shall be also be tested for all functional requirement through communication as part of acceptance test

- **Construction**

Meter Base & Cover

The meter Base & cover shall be ultrasonically welded. The material for base and transparent cover of the meter shall be of thermo setting plastic/engineering plastic respectively.

Thermo Setting Plastic

Self-insulating, non-corroding, thermosetting material which would ensure maximum protection against distortion and injury to working part during normal use and rough handling during transportation. The material shall not soften/melt on heating produced in normal operation of the meter.

Engineering Plastic

The meter casing material should be glass reinforced, flame retardant, unbreakable engineering plastic material to ensure high reliability, long trouble free life, safety against electric shock, spread of fire and effect or excessive temperature. The material shall be corrosion resistant & inert to chemicals, oxidizing agents, petro chemical products, acids, salts and ultraviolet radiation. The meter chamber shall be dust proof and moisture proof. The supplier should indicate hardness, melting temperature and tensile yield strength of the material and necessary test certificates of the same shall be furnished. The meter case and cover should be sturdy enough to prevent damage during transportation and installation.

The engineering plastic housing used may be provided with a key hole on the top for fixing which should not be accessible to the consumer after terminal cover is sealed. The engineering plastic used shall conform to IS 11731 besides meeting the test requirement of heat deflection test as per ISO-75 and Glow wire test as per the relevant standards.

Terminal Block & Cover

The terminals may be grouped in a terminal block having insulating properties and mechanical strength. The terminal block shall be made from best quality non-hygroscopic, flame retardant material (capable of passing the flammability tests given in IS-11731) with nickel-plated brass or aluminium alloy for connecting terminals. The clamping screw should be provided inside the terminal cover and should have metallic sleeve molded within the block to avoid damage during tightening of the screws.

The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor with the help of two screws through agency of a plate so as to made cage type arrangement. The screws shall have thread size not less than M4 and head having 4-6 mm diameter. The screw shall not have pointed ends at the end of threads. All terminals and connecting screws and washers should be of tinned/nickel plated brass material or aluminium alloy. The internal diameter of terminal hole shall be min. 8.5 mm and should comfortably accommodate the 50 Sq. mm cable conductors. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also. The terminal cover shall be engineering plastic with minimum thickness 2.5 mm and the terminal cover shall be of extended type completely covering the terminal block and fixing holes except for the provision of conductor entry at the bottom for incoming and outgoing leads. The terminal cover shall be so provided that it remains permanently connected with meter base. The supplier shall suitably design the cover so that it opens or closes like a hinged door and the ends of hinged pins shall be flattened so that it does not come out. Provision for Minimum two number utility seal(s) as the terminal cover shall be made. Supply voltage circuit is to be connected solidly from inside.

Design

Voltage circuit, sealing arrangement, terminal block, terminal cover and nameplate etc. shall be in accordance with IS-14697 (latest version). The meter shall be compact and reliable in design, easy to transport and immune to vibration and shock involved in transportation and handling. The insulating material used in the meter should be non-hygroscopic, non- aging and of tested quality. The terminal block and meter case shall have safety against spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 14697.

Circuitry

The meter shall have an operational indication device such as blinking LED / LCD given type indication. The following indications are mandatory.

- Power on / pulse output
- Phase available indication
- Load earthling.
- Current reversal.

The operation indicator should be accessible from the front. The mounting of components on the PCB (Printed Circuit Board) shall preferably be SMT (Surface Mounted Technology) type. The circuitry in the meter shall be compatible with 2 x 8 bit (or better) processor and the meter shall be based on digital measuring and sampling technique.

Fixing Arrangement

The meter shall be projection mounted type. Every meter shall have three fixing holes one at the top and two at the bottom. The top hole shall be provided with a special clip at the back of the meter so that holding screw is not accessible to the consumer after the fixing of the meters. The lower fixing screws shall be provided under the sealed terminal cover. The requisite fixing screws shall be supplied with each meter.

Sealing

Minimum 2 No. holes shall be provided for proper fixing of meter cover with 2 No. polycarbonate numbered seals, of good quality, on opposite side (one by the meter manufacturer and the other by the Utility on both opposite side). So that meter internal parts are accessible only after breaking the seals, ultrasonic welding of case/cover of the meter.

Electronic Components

The meter shall be from high accuracy and reliable Surface Mount Technology (SMT) components. The supplier should submit the details of source/agencies from whom purchase of various components of meters used by them, has been done, to the authorized representative/ team deputed for its verification by the Employer.

- **Packing & Transportation**

The meters shall be suitably packed for vertical/horizontal support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing. The meter shall be packed appropriately to ensure safe transportation, handling, identification and storage. All packing materials shall be environment law in force. The primary packing shall ensure protection against humidity, dust, grease and safeguard the meters performance until its installation. The secondary packing shall provide protection during transport. The packing case shall indicate “Fragile in nature” and direction of placement of box. Each packing shall indicate marking details like Manufacturer’s name, S.No. of meters, quantity etc..

Transportation

The meter should not be exposed to undue shock and mishandling during transportation. The stacking of box inside transport media should be such as to avoid their free movement. The packing should also be protected from rain and dust by transport media. The Bidder shall be responsible for any damage during transit due to inadequate or improper packing.

- **Quality Assurance Plan**

Meter shall be manufactured as per quality plan approved by the Employer.

- **Testing and Manufacturing Facilities**

The bidder shall have at least the following testing facilities to ensure accurate calibration as per IS 14697:

- Insulation resistance measurement.
- Running at no load.
- Starting current test.
- Limits of error.
- Power loss in voltage and current circuit.
- Repeatability of error.
- Heating test.
- Effect of Magnetic field of external origin.
- AC High Voltage Test
- Abnormal Voltage / Frequency device Test

- **Inspection**
  - All meters shall be duly tested and sealed by the firm at their premises prior to inspection.
  - The Employer Inspecting Officer will inspect double the number of meters as per sampling plan of IS 14697 (latest version). Max. size lot of 5,000 numbers shall be considered for acceptance test as per IS 14697. Higher lot shall be considered as two or more lots. The inspecting agency can carry out any type test which felt necessary as acceptance test at firm's works. After testing, these sample meters shall be additionally sealed by the inspecting officer and one copy of the inspection report will be handed over to the manufacturer. However, one sample of each successive lot (of 5000 meters) received in the stores will be subject to all tests as per specification from any NABL lab.
  - The supplier shall submit the details of source/ agencies from whom purchase of various components of meters used by them, has been done, to the authorized representative/ team deputed by Employer for its verification.
  - The manufacturer shall be liable to pay penalty of Rs 20,000/- for each occasion at which the fake inspection call has been made. This penalty would be in addition to the expenses incurred by the Employer in deputing the Inspecting Officer for carrying out such inspection.

  In case the material offered for inspection fails in Ist inspection, the Employer will have the right to levy a penalty at 0.1 % of the order value. In case the material offered for inspection fail during the 2nd inspection, the Employer will have the right to increase the penalty to 0.25% of the order value. In case, the material offered fails during the 3rd and final inspection also, the firm will be liable for penal action including forfeiture of EMD, risk

purchase, debarring/ blacklisting in future and no further opportunity for inspection would be provided to the supplier firm.

2.3. Data Concentrator Unit (DCU)

The Data Concentrator Unit is a gateway for communication of data between the Smart Meters and the MDAS. The Data Concentrator Unit receives information from the Smart Meter on a scheduled / need basis and stores the data, which can be accessed by MDAS for onward transfer to MDM at the Smart Grid Control Centre.

The DCU provides the central link between Smart Meters and MDAS, enabling meter read and control. DCU shall exchange data from meters on any proven communication technology and with MDAS on GPRS/GSM communication.

2.3.1. Hardware & Power Supply

- Enclosure/box of DCU shall be IP55 compliant. The installation of DCU shall be suitable for clamp mounting on poles as well as DIN-rail mounting on distribution panels
- Power supply shall be suitable for 3-phase, 3x240V phase to neutral, -40% +20%, 50 Hz AC, so that even in case of outage in one or two phases, DCU can be powered through the healthy phase. Capable of withstanding surges & voltage spikes of 6KV as per IEC 61000-4-5 standards. Power supply shall be terminated on suitable sized MCB to facilitate isolation during site maintenance.
- DCU shall consume minimum power for its operation. It shall also have rechargeable battery with backup for 1 hour for normal meter reading and to push tamper event and carry out on demand reading and the network health status / connectivity continuity & check. DCU should have feature to send power outage and restoration message to the MDAS. The battery shall have a guaranteed life of 10 years.
- Battery backup. The battery shall have a guaranteed life of 10 years. It shall have self-diagnostic feature for RTC, memory, battery, communication module, etc.

2.3.2. Configuration, Functionality & Interface

DCU shall have following configuration functionalities:

- It shall be able to configure the communication with underlying nodes/meters.
- It shall pull data from the field devices and push the data at configured intervals to the MDAS. It should also support the MDAS in pulling data from the DCU. The data acquisition (Push/Pull) frequency shall be programmable. DCU shall be capable to prioritize control commands.
- DCU shall support DLMS/COSEM protocol for transfer of DLMS / COSEM data to MDAS and ensure secure communication to MDAS. Format of DLMS/COSEM is given in Appendix-F.

- DCU shall have internal memory for storing interval data for at least 5 days. It shall be Non Volatile Memory (non-battery backed up) with 10 years data retention in absence of power.
- DCU shall support on demand read and ping of individual/group of meters.
- DCU shall push events like tamper, power off etc. to MDAS immediately on occurrence/receipt from field devices/meters.

2.3.3. Communication

- The DCU also shall have Wide Area Network (WAN) connectivity to the MDAS through digital cellular GPRS/GSM/3G communication connection / Fiber optic communication. In case of GPRS / GSM backhaul, it shall have provision for modem with SIM slot for supporting Dual-band GSM/GPRS module with a valid communication terminal port i.e. RJ45/RS232 for other communication option shall also be provided. DCU modem should support GPRS/GSM SIM card. It shall support SIM card from any service provider.
- DCU shall be able to communicate with meters.
- DCU shall periodically monitor meter reads/downstream commands and shall retry and reconnect in case of failed events/reads.
- After Power Interruption, on restoration of power supply DCU shall establish communication with underlying devices as well as upstream application (MDAS) automatically.
- The retry attempts for meter data acquisition shall be configurable globally or individual meter.
- DCU shall keep record of:
    - No of packet failures
    - Retry attempts
    - Missed periodic reading
    - Failure to connect
    - For each meter upto a period of 3 days and update the same to MDAS periodically.
- DCU shall be capable to handle data of minimum 50 nos of any type of smart meter (1ph/3ph/CT operated). DCU shall be able to acquire and send data to MDAS for full capacity (No. of meters/field devices it is designed for) within a period of 3 minutes. Full capacity of DCU is required to be indicated in the offer.

- DCU shall be able to communicate with the nearest meters at a distance of at least 50 m, depending on topographical features. For further communication among the meters distance of the other meters with the DCU shall not be a constraint as communication of the nearest meters shall be established with other meters through appropriate formation.
- Remote Firmware Upgrade: The DCU shall support remote firmware upgrades as well as remote configuration in order to add new features and functions to DCU remotely from the control centre.
- Configuration of programmable parameters of Smart Meters shall be done through MDAS

2.3.4. Testing of the DCU

DCU shall be tested for EMC and EMI capability as per IEC 61000 for following:

- Fast transient burst test
- Test of immunity to electrostatic discharges
- Test of immunity to electromagnetic HF field
- The contractor shall provide IP 55 compliance test certificate.

DCU functionalities shall ensure AMI/PLM system to achieve performance criteria as specified during performance testing of MDM.

2.4. Installation of Advanced Metering Infrastructure (AMI)

Provisions to be followed for installation of Advanced Metering Infrastructure (AMI) such as Smart meters at consumer & DT end with its accessories such as Data Concentrator Unit (DCU) and other elements used in the communication in the Utility distribution network: Installation shall be done in such a way to ensure proper two way communications, achieving maximum signal strength and coverage of adequate number of meters under a DCU, avoiding any danger in normal conditions, so as to ensure:

- personnel safety against electric shock
- personnel safety against effects of excessive temperature
- equipment safety against spread of fire
- equipment protection against solid objects, dust & water

Contractor shall be responsible for proper storage of all the materials at their own cost, until the system is undertaken by the Employer. The Contractor shall bear the cost of any of the materials lost or damaged during storage and erection. Contractor shall setup required number of stores in consultation with Employer. During the installation of AMI System, it is advisable to the contractor to prepare a schedule of work. Same has to be submitted to the utility for approval. Request for shut down if required any shall be given well in advance.

Indian standards/commonly prevalent industry standard and practices shall be followed during installation.

2.4.1. Installation of Smart Meter

- Replacement of existing energy shall be carried out by Contractor according to the following procedure:
  - Remove old meter
  - Record last meter reading
  - Handover to WBSEDCL in concern sub-division store
- Old energy meters are to be removed in presence of WBSEDCL personnel who must be given conveyance support by the contractor.
- Smart Meter Cabinets shall have to be fixed on meter board which should be made up of high quality Fiber Glass (Reinforced) Plastic material. The board shall have to be preferably transparent in color with dimension of suitable size for the meter with meter box and thickness not less than at least 30 mm. All material (FRP) for the boards must be new, unused, not rebuilt or reconditioned, and shall not incorporate reconditioned or salvaged parts or components. The FRP boards must be fabricated using the superior quality raw materials &machinery and should conform to the latest editions of the standards applicable, if any.
- Employer has the practice of installing meter in meter Box. New polycarbonate meter box matching with smart meter shall be installed. Once the meter is mounted on meter board, no access to the terminals shall be possible unless the meter case or cover is broken through. The meter box door shall have two hinge on one side and sealing arrangement on other side.
- All accessories required for installation of FRP board and meter box shall be provided by the contractor.
- For new connections service cable till the meter installation point shall be provided by employer, however installation of new meter along with board and meter box shall be provided by contractor.
- Contractor has to bring service cable from the nearby pole till the meter installation point (as practiced by utility) and install the smart meter on new meter board/box.
- For fastening equipment and fittings to buildings only galvanized steel screws or screws made of non-corrosive material of strength shall be used.
- After meter installation, customer identification no., meter ID its hardware & software configuration, name plate details & make, type i.e. 1 phase or 3 phase, etc. shall be recorded and updated in DCU/MDAS/MDM by the Contractor. All meters falling under one DCU shall be commissioned and checked for proper communications in presence of employer.

- **Location**

  The meter shall be preferably located in a building, outside living area, suitable for physical inspection without entering into consumer's living area. However Meter shall be installed as per prevailing utility practice, in case of some old meters are installed against the prevailing practice of the utility, contractor shall shift the meter to new location in line with utility practice, all the necessary wiring and civil work involved shall be done by the contractor.

- **Civil Works**

  Civil works associated with the installation of the smart meters such as pointing, grouting, mortar touch-ups, carpentry, etc., are to be done by the contractor. Erection of supporting structure for the stability of meter case is to be done by the contractor only with the approval of the site-in-charge.

2.4.2. Installation of Data Concentrator Unit (DCU)

DCU will collect the data from the smart meters and send to MDAS at the utility control center.

- **Location**
  - Contractor shall finalize the location of DCU to meet the specified performance criteria. DCU have to be installed at certain nodes such that the reception of the signal is maximum, affirming the requirements of the specification.
  - Mounting of DCU can be on wall or distribution poles, or separate supporting structure based on the requirement. Pole mounting/wall mounting is to be done with proper galvanized iron flats/strip to pole designed for weight of DCU. It is to be locked and protected for secured access of the O&M people. DCU must be protected against ingress of water/moisture/dust/insect. Any damage or discrepancies to the DCU and its components such as sensors, displays, alarm systems, etc. have to be replaced by the Contractor.

- **Installation Quality**
  - The employer shall check on the quality of installation by checking performance of the sensors, wiring methods, alarms, communication to control centre & time lag in data acquisition & to certify for acceptance to contractor.

2.5. Meter Data Acquisition System (MDAS)

Meter Data Acquisition System has to acquire smart meter data, select consumer meters automatically from remote avoiding any human intervention and monitor parameters acquired from smart meters.

Meter Data Acquisition System is the core application for interface to the smart meter. The MDAS shall perform following functions:

- Acquisition of meter data on demand & at user selectable periodicity
- Two way communication with smart meter/ DCU
- Connect & disconnect for Load Control and Pricing signal
- Audit trail and Event & Alarm Logging
- Shall support encryption of data for secure communication with smart meter ,DCU & MDM
- Maintain time sync with DCU / smart meter
- Store raw data for defined duration
- Handling of Control signals / event messages on priority
- Setting of smart meter configurable parameters

2.5.1. Configuration

MDAS shall facilitate programming of following meter parameters:

- Load profile capture period
- Demand integration period
- Setting of parameters for time of day (TOD/TOU) billing
- Billing date
- Clock setting
- Connect /disconnect of relay load curtailment limit – current limit, voltage limit, power limit
- Event setting for connect/disconnect
- Number auto reconnection attempt
- Time interval between auto reconnection attempt
- Lock out period for relay
- Remote firmware upgrade
- Password setting
- Push schedule
- Setting threshold limits for monitored parameters
- Provision for adding more programming features in future

2.5.2. Communication

- MDAS shall communicate with GPRS meters/DCU using DLMS/COSEM protocol
- MDAS shall automatically retry for missed data; the number of retry attempts shall be configurable.
- To receive confirmation on successful execution of a command.
- MDAS shall ensure data integrity checks, for example, checksum, time check, pulse, overflow, etc. on all metered data.

2.5.3. Monitoring and reporting capability

MDAS shall have critical and non-critical reporting functionality. The critical Information generated from this reporting functionality shall be made available to MDM at user configurable periodicity.

2.5.3.1. Critical Reporting

- MDAS shall have alarms and event log for meter events (tamper/power failures etc.)
- If data not received from DCU/ Smart Meter
- If relay does not operate for connect / disconnect

2.5.3.2. Non Critical Reporting

MDAS shall report and keep record of following communication failure events:

- Communication link failure with DCU/ Smart Meter
- Network Failure
- No of packet failures
- Retry attempts
- Missed periodic reading
- Failure to connect

MDAS shall support reporting of communication failure history of smart meters /DCU etc. and give an exception report for smart meter /DCU not communicating for last 2 – 24 hours (the reporting period shall be user configurable period) MDAS shall have feature to send email notification of configured alarms & events to selected users.

2.5.4. Integration

- MDAS shall preferably interface with MDM on standard interfaces and the data exchange models and interfaces shall comply with CIM / XML / IEC 61968.
- The solution shall be Service Oriented Architecture (SOA) enabled.

2.5.5. Others

- MDAS shall be developed on open platform based on distributed architecture for scalability without degradation of the performance using additional hardware.
- MDAS shall support storage of raw meter data, alarms and alerts for minimum 45 days.
- MDAS should comply with CERT-in security requirements with access control, security patches ,security management & vulnerability management system

2.6. Meter Data Management System (MDM)

The Meter Data Management System should support storage, archiving, retrieval & analysis of meter data and various other MIS along with validation & verification algorithms. It shall act as a central data repository. MDM shall have capability to import raw or validated data in defined formats and export the processed and validated data to various other systems sources and services in the agreed format. It shall provide validated data for upstream systems such as billing, customer care, Load Analysis, Load Forecasting, and PLM etc.

The vendor shall specify and deliver an initial system that supports the collection and storage of 15 minute interval data for 43000 Smart meters. The system shall be readily scalable to accommodate 100% expansion over the life of the contract. The MDM shall have the ability to selectively choose which data to be maintained and which to be purged or archived.

2.6.1. Functional Requirements

2.6.1.1. Asset Management

- The MDM shall maintain information and relationships between the current installed meter location (apartment, shop, industry etc.), Consumer information (Name/ address etc.), Consumer account no, Meter ID, Type of Meter (1 phase, 3phase, with relay, without relay etc.), Meter configuration (Demand integration period, Load profile capture period etc.), GIS supplied information (feeder, transformer, pole etc.).
- The software should support tracking the status of meters and communication equipment from when they are installed in the field. The history of the in-service asset location is maintained throughout the device life with start and end dates associated with each in-service location reference.
- MDM shall access GIS Data from existing R-APDRP System. Contractor shall have to provide suitable adaptor to access data from existing R-APDRP system
- Ability to report and log any damage / deterioration in the meter attributable to consumer / utility.

2.6.1.2. AMI Installation Support

- The MDM shall generate exceptions for meter or modules not delivering the correct meter data after installation.
- The MDM shall provide a reconciliation report that identifies the meters that have been installed but not communicating for a designated (configurable) period. MDM shall generate reports on the number of meters installed in comparison to the number of meters successfully communicating.

2.6.1.3. Meter Data

- The MDM shall accept input, process, store, and analyze Meter data from MDAS and meter data collected through hand held meter reading instruments and manual meter reads. In case of manual reads, provision should be there to insert associated notes like assessed energy, etc.
- The MDM shall provide storage of all collected Meter Data, events and alarm. It shall have capacity of storing 2 years data.
- Correctly track & resolve energy usage across meter changes with no loss of individual meter data.
- Provide complete history and audit trail for all data collected from meters including commands sent to meters and other devices for 30 days (configurable period).
- Execute on-demand read processes.
- Handle special metering configurations like net metering/multiple meters at same premises.
- The MDM shall have the ability to manage at a minimum 15 minute interval data.
- Data Integrity- Contractor shall ensure data integrity checks on all metered data received from data collection systems.

2.6.2. Data Validation, Estimation, and Editing (VEE)

- The validation and estimation of metered data shall be based on standard estimation methods.
- MDM shall flag, alarm and trigger an estimating process including but not limited to when the following anomalies occur in the cumulative (“CUM”) register reads
  - CUM Decrements within a billing cycle
  - CUM reads increments more than configurable threshold
  - Future or old read dates
  - Number of meter display digits exceeds
- MDM shall detect, flag, alarm and trigger an estimating process including but not limited to when the following anomalies occur in Time of Use (TOU) register reads

- Register Decrements
- Resets (to zero)
- CUM reads increments more than configurable threshold
- Future or old read dates
- Erratic compared to CUM read (sum of TOU reads minus CUM read)

- MDM shall detect, flag, alarm and trigger an estimating process including but not limited to when the following anomalies occur in Demand register reads
  - Do not reset on cycle
  - Do not reset coincident with customer move-out or move-in
  - Reset off cycle inappropriately
  - Too high
- All data shall be transferred to billing system after meter data validation and estimation including transformer / feeder station wise energy audit.
- MDM shall estimate usage for non-metered service points such as street lights, farm lights, traffic signals, etc.
- The MDM shall maintain both the original received raw data in a non-manipulated state, in addition to VEE data.
- Notwithstanding the latency of data collection via the AMI system, once the MDM receives meter read data, the VEE process occurs in real-time and the post-VEE data is then immediately available to user or external systems.
- The MDM shall automatically flag data changes from manual edits, VEE (Validating, Editing and Estimating) rules and data source corrections and electronically generate audit trail with timestamps and user-ids.

2.6.3. Billing Determinants Calculations

- The MDM shall allow to configure multiple TOU/TOD options (e.g. the number and duration of TOU rate periods) by customer type, tariffs and day type (weekend, weekdays, and holidays) and by season.
- Shall support the processing of interval data into billing determinants. Electric billing determinants to include the following at a minimum:
- Total Consumption
- Consumption in peak / off peak hours for ToU billing
- Maximum Demand kW and kVA
- On-Peak Demand
- Number of tamper count
- Average power factor

- Process interval data and frame it into the appropriate TOU periods for consumption and demand; for example, roll up 15 minute data intervals into hourly data.
- Properly account for special metering situations such as check metering, sub metering and net metering when calculating billing determinants and sending them to billing and other systems.
- Properly account for special situations including, but not limited to, curtailment requests, demand response scenarios when calculating billing determinants and sending them to billing software.

2.6.4. Exception Management

- Capture and log data exceptions, problems and failures and to generate management reports, provide trend analysis, automate generation of service requests and track corrective actions.
- Group, prioritize, filter and send system generated alarms and events to defined email addresses, cellular text messages to phone numbers.
- Exception Generation - MDM shall generate exceptions based on configurable business rules including but not limited to the following:
  - Meter tamper alerts
  - Communication module health alerts for Meter/DCU
  - If the consumption is less/more than pre-defined average consumption
  - Negative Consumption
  - Power outage indications received from the Smart meter

2.6.5. Service Orders

- The MDM shall generate service orders based on configurable rules for various events and alarms such as stop meter, tampers, problem in communication networks, AMI host server, etc.
- MDM shall send service orders via SMS, email, etc with the email addresses / phone numbers being configurable.
- MDM shall receive feedback on action taken on the service order and track the status of service orders.

2.6.6. Customer Service Support

- The solution shall provide customers with access to current and historical consumption and interval data, outage flags, voltage and power quality indications. The data shall be displayed in graphical and tabular form depending on user choice.
- The Customer may also access data through customer portal

2.6.7. Analysis

The MDM shall have analysis capability based on configurable business rules including but not limited to the following:

- Display consumption/load profiles by configurable period (15 min, hour, day, month, year etc) day type (weekday, weekend, holiday, etc.) and by rate class, customer type, or any user specified collection of meters.
- Generate peak & off-peak load patterns by aggregating all loads of DT/Feeder/consumer group.
- Perform DT/feeder wise energy audit.
- Perform loss analysis for different groups and categories of consumers.
- Perform error management like: Missed reads and intermittent meter reads before taking into forecasting, load research or demand response
- Configure the system to effectively visualize consumption trends, identify unusual patterns, and visualize load analysis to understand which assets are being over utilized.
- Analyzing data to identify new patterns of usage, Setting fraud alert / transformer overload alerts / demand – supply gap alert etc.
- Receive and store outage and restoration event data from smart meters and outage systems and to log all such events for analysis.
- Analysis of Power Quality related data

2.6.8. Reporting

- The solution shall include a list of the standard reports that are provided with the MDM including but not limited to following:
  - Usage exceptions
  - VEE validation failures
  - Missing Read date and times
  - Physical meter events (install, remove, connect, disconnect)
  - Meter flags
  - Meter inventory
  - defective meters
  - AMI performance measurements
  - Threshold Exception
- The solution shall support users modifying standard reports to better meet specific reporting requirements.

- The MDM shall enable the Utility to deliver reports in standard digital format such as PDF, Excel, etc.
- GUI to set up or change report delivery to configurable email addresses, network file directories, ftp sites or printer systems without modifying source program code and without any proprietary language skills.
- All queries shall be generated through user driven drop down menu in GUI. The Bidder shall provide example queries to support internal report generation needs.
- Provide daily & weekly interface exception reports between MDM and other subsystems e.g. billing, outage, etc.

2.6.9. Revenue Protection Support

- Analyze meter tampering flags, power outages, usage trends and usage profiles to identify potential energy diversion situations, and produce daily reports, monthly reports and service order requests for investigation.
- The business rules for revenue protection alerts shall be configurable via a user-friendly interface.
- The MDM shall filter out revenue protection alerts that may be caused by field activities if the field activity information is provided to the MDM.
- The MDM shall support the analytics/investigation (i.e. view current and historical usage patterns) to valid suspected revenue protection issues.

2.6.10. Demand Control/Demand Response Support

- Bidder shall describe how its MDM supports Smart Grid Demand Response programs involving DR systems as part of PLM.
- The solution shall support the following analysis:
  - Totaling the actual consumption during the DR event.
  - Totaling the actual consumption of accounts that participated in the DR event.
  - Comparing the actual to baseline consumption for the groups in above.
  - The MDM shall support the tracking, monitoring and managing of DR assets and events, and monitors customer response to facilitate payment of customer incentives.

2.6.11. User Interface

The user interface shall have ability for at least the following functionality:

- Display meter data at a user defined configurable cycle through a GUI that allows authorized users to view energy usage patterns and the data behind them for selected customers.
- Allow authorized users to view metered data, initiate and view reports, modify configurations, and initiate and update service requests via a GUI.
- Display via a GUI the energy usage profile for a single meter or group of meters. The load profile shall illustrate energy consumption and peak demand in user defined intervals for a user-specified time period.
- Access to a minimum of 2 years of historical energy usage and meter reads through the GUI to support energy management, customized billing, and complaint resolution and customer education.
- GUI to clearly and visually distinguish between metered, estimated, allocated and substituted data.
- GUI to provide role-based access based on user identity and user role. Shall have following types of users:
  - Administrator
  - Operator
  - Field staff
  - Viewer/Guest
- Configure the look, feel, and functionality of the MDM in accordance with business needs, business processes, and business conventions. (e.g. GUI, content, look and feel of screens, validation rules, exception handling, etc.).
- The UI should also provide alerts based on user defined criteria which would be dispensed in the form of emails, portal alerts, mobile phones or text messages etc.

2.6.12. Integration with Other System

MDM shall preferably interface with other system on standard interfaces and the data exchange models and interfaces shall comply with CIM / XML / IEC 61968/62056/IS15959/ Indian Companion Specification. MDM solution shall be Service Oriented Architecture (SOA) enabled.

MDM integration with other systems shall include but not limited to the following:

1) MDAS for data exchange from other AMI solution
2) Utility Administration
3) Existing other Data Collection Systems
4) Billing & collection system, Consumer indexing, asset management system

5) GIS Systems

2.6.13. Performance Testing

Testing of AMI system shall be done as per the performance testing matrix attached below.

Testing of Data Availability – The tables show the expected data availability

Performance Requirement for User Interface

S. No	Description	Check Duration	Data availability
1	Interval Read	Daily	80%
2	Interval Read	Weekly	85%
3	Interval Read	Monthly	90%
4	Loss of Supply & Tamper	Reporting % in 5 minute	80%
5	Loss of Supply & Tamper	Reporting % in 15 minute	85%

The user interface performance testing shall be done as per following criteria-

S.No	User Interface Requirements	Response Time
1	Any real time display and application display on workstation console along with data values shall appear on screen.	Within 2 sec
2	Manual data entry of the new value appears on screen.	Within 2 sec
3	Display Update rate	2 sec for 4 displays together
4	Response time for display of Alarm and event after receipt in system	Within 1 sec of receipt in system
5	Alarm and event acknowledgement	Within 2 sec

6	Requests for printing of displays (to be acknowledged with an indication of request is being processed).	Within 2 sec
7	Requests for generation of reports (to be acknowledged with an indication of request is being processed).	Within 2 sec

2.6.14. Technical Obsolescence

The systems which are at a risk of technical obsolescence over the operating life of the system should be identified; this should include end-of-sale and end-of-support policies governing the proposed technologies. Forward and backward compatibility need to be considered and mitigation options described in detail. The mitigation shall not be limited to periodic update from OEM/System supplier.

2.7. Hand Held Unit (HHU)

2.7.1. General Technical Requirement

This specification covers requirements of HHU or Common Meter Reading Instrument (CMRI) for reading the data of meters, uploading in HHU and to download the same to window based system or Meter Data Management System (MDMS). CMRI shall be tailor-made for downloading data stored in the memory of smart meters (three phase whole current meters, single phase whole current meter, 3 phase CT operated meter etc.) to window based system or Meter Data Management System (MDMS). Each device shall be provided complete with:

1) a lead with optical head for coupling it to the smart meter,
2) a lead for plugging it to a personal computer;
3) an internal battery for powering the devices;
4) a case for safely carrying it
5) a battery charger

The total arrangement shall be such that one (1) operator can carry out the whole operation himself, in about five (5) minutes per meter.

The HHU shall have a key for starting the data downloading from the coupled meter's memory; Data downloading operation shall not erase the data from the meter's memory, or effect the meter operation in any way. The memory of the HHU shall get automatically cleared when the data has been transferred to the PC or MDM.

HHUs shall also have the necessary provision for performing following operation on the meter through password protected code:

1) RTC correction and synchronization
2) Smart meter relay connection/reconnection.
3) Demand integration periods setting
4) Load survey interval setting
5) Maximum demand resetting

HHUs should have adequate memory, to host application software, for enabling downloading of meter data.

The Contractor shall provide the necessary software which would enable any window based computer system / MDM to (i) accept the data from the HHU and store it in its memory, starting from a certain date and time, as per operator's instructions, (ii) transmit the collected data through an appropriate communication link to the central computer, starting from a certain date and time, as per operator's instructions, and (iii) store the collected data on external storage device like USB drive or CD.

The above software shall further ensure that absolutely no tampering (except total eraser) of the collected metering data is possible during its handling by the computer system/MDM.

HHU should be compatible with optical port of the meter for receiving the data from the meter to the HHU/Hand Held UNIT and ultimately transferring to BCS &vice versa for loading required instructions to the meters. Suitable cable for this purpose shall be provided by contractor.

HHU should conform to CBIP Technical Report No. 111with latest amendments with Level (2) IP 67 protection and following standards:

1) CBIP Technical Report no. 111 – Specification for common Meter reading Instrument.
2) IS 9000: 1979 – Basic environmental testing procedure for electronic & electrical items
3) IEC – 61000 – Electromagnetic compatibility
4) IEC – 61000-4-2 : (latest amendment) – Electrostatic discharge immunity test
5) IEC– 61000–4-3 : (latest amendment) – Radiated, radio – frequency electromagnetic field immunity test, Magnetic immunity test

The offered HHU should have capacity compatible to read minimum 200 meters for billing & tamper data but without load survey and minimum 100 meters for billing and tamper data with load survey.

2.7.2. Physical Characteristics

1) Size: HHU should be handy, lightweight and small in size for ease of portability.

2) Weight: Weight of HHU including batteries shall be less than 1.0 kg.

3) Enclosure: HHU casing shall be of electrical insulating material of high thermal stability and mechanical strength. Its degree of protection confirms to IP 67 LEVEL (2) as per IS 12063 / IEC-529.The enclosure should be solvent resistant and shall be provided with a suitable holding Strap for proper gripping.

4) Ruggedness: HHU is able to withstand harsh field environment without physical damage or loss of data.

5) Display: The display of HHU is having the following characteristics.
   a) Easy readability in varying ambient light conditions.
   b) 4 lines and 20 characters per line on the screen
   c) The size of the character shall be 4 mm
   d) The contrast and intensity control to get a clear display in varying ambient light.

6) Key Board: The keyboard of the HHU is having the following attributes.
   a) Long operation life i.e. minimum 100000 operations
   b) Feedback for key press acknowledgement to user.
   c) Legible and non-fading keypad imprints for all alphanumeric characters/symbols.
   d) Each English alphabet shall have a separate key.

7) Input / Output ports (I/O Ports)

8) The HHU shall be having two serial input/output Ports; one port shall be serial port RS 232C compatible. Another optional port can be used for convenience of connecting peripherals such as bar-code reader, printer, battery charger, loader charger etc.

9) The offered HHU shall be able to provide power supply for optical sensor used for meter reading applications.

2.7.3. Physical interface

2.7.3.1. Interface between meter and HHU:

The interface between a meter and HHU shall consist of 2 parts.

1) Meter optical sensor terminating in to a 9 pin D type male connector with a cable of 500 mm +/- 10 mm. Length.

2) The interface between a meter and the offered HHU shall be with a flexible shielded cable of length 1500 mm +/-10mm having 9 pin D-type female connector with electrical circuit. This cable shall be supplied along with HHU. The two ends of the cable is stress relieved.

2.7.3.2. Interface between HHU and Base computer station:

Suitable flexible shielded cable of sufficient length for communication between HHU and base computer station shall be provided. This communication shall be serial RS232C. On the base computer station end of the cable a 9 pin D-type female connector shall be provided. The two ends of the cable are stress relieved. This cable shall also be provided along with the HHU.

2.7.4. Hardware and Software requirement

1. Operating system :

   a) To facilitate downloading of data from meters, MRI program shall be provided for computer system & MDAS system. The facility to upgrade the BIOS/OS by a HHU Contractor shall be available without exposing the hardware of the HHU.
   b) The additional program necessary to transfer application programs with serial port shall be provided.

2. The HHU shall be able to communicate for-

   c) Down loading / up loading data from / to the meter
   d) Uploading / downloading data to / from the Base computer station
   e) HHU shall be capable to read bar code information using a bar code scanner from barcodes of ac static \ electromechanical electricity meters by using appropriate scanner and bar code software.
   f) HHU shall support flexible baud rate ranging from 300 Baud to 19200 (or higher) Baud rates to cater communication needs stated above.

3. Real time clock :

   A real time clock is provided in the HHU, which have the following features:
   a) Power requirement: The clock shall have a minimum of 15 days battery backup.
   b) Calendar: The clock shall have 20 years calendar.
   c) Time drift: The time drift shall be negligible and shall not exceed 20 seconds per day.
   d) Time Setting Facility:

      i. The HHU shall have the facility to get its time set from Base computer station. Proper security for this is ensured using password.

4. Power supply (Battery) for HHU:

   a. The HHU shall have the following features for its power requirements:
   b. The HHU shall be powered by rechargeable battery housed within its enclosure.
   c. The average capacity of charged battery shall be sufficient to communicate with meters and base computer station for at least :

i. 6 hours while communicating through optical interface of meters and
ii. 8 hours without powering Input / Output ports for optical interface.

d. To reduce the equipment down time and inventories, there shall be provision to charge the HHU battery without being removed from the equipment. A suitable battery charger for charging of HHU battery shall be provided.
e. There would be a provision for AUTO POWER SAVE, which force the instrument in the power saving mode in case of no activity within 5 minutes.
f. The battery used for data retention in SRAM would have a minimum of 3 years backup capacity.
g. The HHU would have battery low indication and automatic cut-off to avoid further drain of the battery.

5. Software

a. The following software shall be provided in the offered HHU:
b. Necessary software for loading application programs via a serial port for uploading and down loading between HHU and window based Computer system & MDAS.
c. Provision for loading the software into the HHU of the specific makes of the meters, for the purpose of reading and programming of the specific make(s) of static meters, such Software shall be provided by respective meter manufacturers.
d. Computer software for accepting data from HHU, processing generating reports and downloading instruction from Computer System to HHU.

6. Special Requirement:

a. The offered HHU shall have provision for storing the third party software and can also be loaded for special applications such as manual meter reading, data entry through keyboard of HHU, printing, display of balance memory etc.
b. The HHU shall have facility to draw/display vector diagram of the electrical conditions existing at site to check the healthiness of the connections.
c. The HHU shall have provision to read the energy registers so that accuracy testing can be done at site with standards calibrating equipment.
d. The HHU shall have the provision to read the various instantaneous electrical parameters at site like voltages, current, PF, phase angles, power (kW, KVAr, and KVA) frequency etc.
e. The HHU shall have facility to estimate the memory space available before reading the meter.

2.7.5. Data Security

The contractor is responsible for maintaining the security of the data extracted from the meters using manufacturer specific algorithm in the software up to downloading to BCS.

2.7.6. Type Test

HHU shall be type tested as per clause 5 of CBIP Technical Report No. 111.

2.7.7. Acceptance Tests for HHU and Software

All HHU after final assembly and before dispatch from Contractor's/Manufacturer's works shall be duly tested to verify that they are suitable for supply to the Purchaser. In particular, each and every HHU shall be subjected to the following acceptance test:

1) Functional Checks
2) Downloading Meter Data from the Meter(s)
3) Compatibility with PC software
4) Downloading the meter data on window based computer system
5) Functioning of advance and retard time commands
6) Per meter downloading time verification
7) Capacity of HHU for data storage

---------- End of this Section ----------

Section 3

Peak Load Management (PLM) System

Section 3. Peak Load Management System

3.1. Peak Load Management Functionalities

Peak Load Management (PLM) shall include the following functionality:

1) Consumer category wise Time of Use (ToU) tariff on daily/weekly/monthly/ quarterly, etc shall be made available on the consumer portal.

2) Daily load forecasting for the project area on hourly basis.

3) Import hourly drawl schedule (to be made available by the Utility) for the project area.

4) Load Profiles for time of day, day of week (weekday, Saturday/Sunday, holidays, festivals), monthly, annually across consumer meters, distribution transformer, feeder and system level.

5) Analysis of Surplus/ Deficit situation in daily drawl schedule.

   a) Based on the above analysis design demand response (DR) and demand side management programs.

   b) Command to be given to MDM for reduction of drawl limit for identified group of consumers.

   c) Notification for the modification in drawl limit to be sent to the consumers via SMS, email, etc as well as made available on the consumer portal.

   d) Segmentation of consumer based on past consumption pattern.

   e) Anticipation of load which may be high in future.

   f) Compare load profiles of different consumers (residential, commercial, HT and DT)

   g) Analytical process for incentivizing program for optimal ToU pricing.

   h) List of potential customers that may adopt or accept a 'Power Reward' program

6) On completion of demand response event drawl limit of the above consumers to be restored.

---------- End of this Section ----------

Section 4

Hardware Requirements

Section 4. Hardware Requirements

4.1. General

This section describes the technical requirements of all the hardware envisaged in the BOQ for the control centre system. The minimum hardware specifications (RAM, Aux. Memory, interfaces etc.) for all equipment are specified in Technical Specification for Hardware. The contractor has to submit the details of the supplied hardware along with the bid as per format attached in Appendix-C**.** The Contractor shall asses the adequacy of hardware specified in the BOQ and if any additional hardware or higher end hardware configurations are required to meet all the requirements of the technical specifications, the same shall be included in the offer. The Bidder's proposal shall include necessary calculations to clearly establish that the proposed hardware meets the functional and performance requirements of the technical specification.

The Bidders are encouraged to optimise the requirement of hardware for servers and processors where one or more applications can be combined or distributed in any combination with adequate redundancy without affecting the performance requirement. However critical applications are to be hosted on independent hardware.

4.2. Technical Requirements for Hardware

All hardware shall be manufactured, fabricated, assembled and finished with workmanship of the highest production quality and shall conform to all applicable quality control standards of the original manufacturer and the Contractor. All hardware components shall be new and suitable for the purposes specified.

All hardware shall include self-diagnostic features. On restoration of power after interruption they shall resume operation automatically. All servers, workstations and network equipment (Switches, routers, firewall etc.) shall be compatible for remote monitoring using secure SNMP Ver. 3.0. All hardware shall support both IPv6 and IPv4 simultaneously.

The contractor shall ensure that at the time of final approval of hardware configuration and BOQ, all the hardware is as per the current industry standard models and that the equipment manufacturer has not established a date for termination of its production. Any hardware changes, except version upgrade in same series, proposed after contract agreement shall be subject to the following:

1) Such changes/updates shall be proposed and approval obtained from Employer along with the approval of Drawings/documents.
2) The proposed equipment shall be equivalent or with better features than the equipment included in the Contract.
3) Complete justification along with a comparative statement showing the original and the proposed hardware features/parameters including brochures shall be submitted to the Employer for review and approval.
4) Changes/updates proposed will be at no additional cost to the Employer.

5) The porting of software shall be at no additional cost in case of replacement of hardware during the AMC period.

4.3. Hardware Configuration

In this technical specification all hardware has been broadly classified as “Server” and “Peripheral device”. The term “server” (also referred as “processor”) is defined as any general-purpose computing facility used for hosting application functions as defined in the specification. The servers typically serve as the source of data, displays and reports. The term “Peripheral Device” is used for all equipment other than servers. Peripheral device includes Workstation consoles, WAN router, LAN, printer, Time & Frequency system, Firewalls etc.

The redundant hardware such as Servers, Firewall, and LAN etc. shall work in hot standby manner. All the servers and networking equipment (Firewalls, LAN equipment etc.) shall be mounted in rack panel. The Proposed schematic diagram is attached at **Appendix-E**

4.4. Servers

The Servers shall have provision for expansion of the Processor, auxiliary memory and Main memory (RAM) by 100% of the delivered capacity. This expandability shall be possible at site with addition of plug in modules only. Initially USB ports of all work stations shall be disabled.

Servers shall be mounted in a rack (panel) and a single rack mountable TFT monitor, keyboard and mouse using a KVM (switch to access all servers & peripherals) in the panel. However the grouping of servers in a rack shall be such that the primary and backup servers for a system function are located in different racks.

All servers shall have dual redundant power supplies, capable to operate on single power supply module. There shall not be any interruptions in the operation of servers when there is a failover between the two AC Power Supply of the server.

4.5. Web Server

Web server shall be provided to allow the access of system data (AMI/ MDM/PLM), displays and reports by Remote VDUs/external users.

Web server is connected on one side to AMI/ dual LAN and on other side to Web server dual LAN. Web server shall be provided with suitable firewalls on both sides (i.e. towards AMI/ MDM/PLM) dual LAN and towards Web server dual LAN) in order to block the possible entry into AMI/MDM/PLM system by an intruder. It is required that both side firewalls are supplied from two different manufacturers & preferably of different technology.

Web server shall also be provided with host based Intrusion detection system (HIDS) and network based Intrusion prevention system (NIPS). The HIDS will be installed in the Web-server. The NIPS shall be installed for the AMI/ MDM/PLM dual LAN and the Web-server dual LAN.

All necessary hardware & software for Web Servers with firewalls and HIDS/NIPS shall be installed by the contractor.

A separate Computer shall be supplied to be used as Centralized management console for the HIDS/NIPS and firewall. The management console shall perform the following functions:

- Create and deploys new policies
- Collect and archive audit log for post event analysis
- Maintain an Integrated Event Database
- Provide an integrated Reporting System.
- Performance monitoring

4.6. Networking Equipment

4.6.1. Firewall

Firewalls shall be provided as per BOQ. It is required that both side firewalls (Internal and External) are supplied from two different manufacturers. All firewalls shall be hardware box firewall as per the requirements mentioned in **Technical Specification for Hardware.**

4.6.2. Routers

Routers shall be capable for data exchange between various communication media such as copper cable, PSTN /leased line, fibre optic cable, VSAT etc. Routers shall have the built-in firewall features as required.

4.6.3. Host based Intrusion Detection System & Intrusion Prevention System (Network Based)

The contractor shall provide host based intrusion detection system & Intrusion Prevention system as per the parameters mentioned in this technical specification.

4.6.4. Local Area Network (LAN) and device interfaces

Servers and peripheral devices are connected to each other on local area network (LAN). LAN switches shall be as per the features mentioned in this Technical Specification.

4.6.5. Storage Area Network (SAN) based Storage

A SAN (Storage Area Network) based storage shall be provided which shall be sized adequately and shall be used for online storage and all online data backup. It shall be possible to take and store image backup of all servers & workstations on it. The SAN shall facilitate data storage for all applications AMI/MDM/PLM.

4.7. Workstation Consoles

Workstation console shall consist of a workstation driving one or more monitors, a single wireless keyboard and a wireless mouse. The user shall be able to switch the keyboard and mouse, as a unit, among both the monitors at a console seamlessly.

Workstation consoles shall be used by the utility for control, monitoring and operation of AMI /PLM applications and other web interfaces. All workstation consoles shall support full-graphics displays.

Each workstation in the Control room shall be provided with two speakers for alarming as per Specification. In addition to the speakers, the Contractor shall provide all other interface hardware, such as cables and connectors as required.

4.8. Printers

All printers shall be interfaced with single Ethernet LAN. Except for output capabilities unique to any printer type (such as extended character sets or graphic print capabilities), there shall be no limitations on the use of any printer to perform the functions.

4.9. GPS based Time Facility

To determine Universal Coordinated Time (UTC) source, GPS based Time Facility shall be provided for Control Centre computer system. The time receiver shall include propagation delay compensation and shall also include an offset to permit correction to local time.

The time receiver shall detect the loss of signal from the UTC source. A loss-of-signal shall be sent to the computer systems.

The GPS system receiver unit shall have digital displays for viewing UTC day of the year, time and frequency display.

All required interface in this regard shall be included in the scope of supply.

4.10. Configuration Requirements

Every critical function must be supported by sufficient hardware redundancy to ensure that no single hardware and software failure will interrupt the availability of the functions for a period exceeding the automatic transfer time.

Replacement of faulty items of the system and its restoration shall not result in any loss of functionality or performance. The stand by elements of redundant system shall be fully monitored at all times.

For non-critical functions no hardware redundancy is required.

4.11. Error Detection and Failure Determination

All Servers, devices, applications, and maintenance functions in system shall be monitored for fatal and recoverable errors. All errors shall be recorded by the system for review by maintenance personnel. Each type of error (e.g., Server failure, memory access violation, device reply time-out, or message checksum error) shall be recorded separately with a date and time tag.

Failure monitoring logic shall be distributed within the computing network and shall detect all failures that affect the availability of network resources or services. Failure monitoring functions

shall be independent of application function and user modes. The failure monitoring and error detection function shall preferably provide event notification for 3rd party products e.g. SNMP messages.

4.11.1. Server Errors

All fatal and recoverable errors of all Servers operating states shall be detected and recorded by the AMI system. Server failure shall be detected and annunciated to the user within 5 seconds of the failure.

4.11.2. Device Errors

All fatal and recoverable errors of all peripheral devices shall be detected and recorded. Each type of recoverable error shall be assigned a threshold by the programmer. Peripheral device (except printers) failure shall be detected and annunciated within 5 seconds of the failure.

4.11.3. Software Errors

Execution errors in on-line and maintenance functions that are not resolved by program logic internal to the function shall be considered as fatal software errors. Fatal software errors shall result either in termination of the function or shall be handled as a fatal Server error. On the occurrence of each fatal software error, Server and operating system error codes and messages shall be recorded.

4.12. Hardware Redundancy and Configuration Management

Failure of primary server should be detected and system should be automatically transferred to standby server. It should create alarms and errors files for the primary devices. All devices assigned to the failed Server shall be reassigned to its standby Server without any manual intervention.

In case of non-recoverable errors servers should restart automatically in a defined time. Restart should initialize all other functions.

The contractor shall provide two (2) dedicated internet service connectivity for field data and consumer access. Each connection shall be sufficient to handle data independently without overloading communication network more than 70% under worst case scenario (e.g. post blackout on restoration of power all meters and field devices start to communicate with MDAS and try to push power on/off event).

4.13. Technical Obsolescence

The systems which are at a risk of technical obsolescence over the operating life of the system should be identified; this should include end –of-sale and end-of-support policies governing the proposed technologies. Forward and backward compatibility need to be considered and

mitigation options described in detail. The mitigation shall not be limited to periodic update from OEM/System supplier.

4.14. Power Supply for Control Centre equipment

The computer hardware system should be suitable for operation with single-phase, 240 +10% Vac, 50+5% Hz power supply. The Contractor shall provide additional fuses, switches and surge protection, if necessary, to protect the computer system hardware. All cables supply, laying & their termination between UPS panel & computer system shall be in the scope of contractor.

In case of low battery capacity condition in the UPS, the computer system shall undergo an orderly shutdown to avoid corruption of any software applications & damage to computer hardware.

4.15. Furniture

The contractor shall provide furniture as per the following specifications. All furniture shall be of reputed make. However the specific design, finish and colour of all furniture shall be subject to Employer's approval.

4.15.1. Workstation desk

Each workstation/ shall be provided with a suitable desk as follows:

- Sectional frame suitably clad with hardwood or hard wearing material.
- Desktops of a durable, scratch resistant, non-reflecting finish of suitable thickness.
- Proper Channels for Power, LAN and Telephone cabling with 100% spare capacity.
- Adequate space shall be provided on the desktop for writing area, to accommodate the operator workstation, mouse, telephone console and other miscellaneous items.
- Drawers, shelves and miscellaneous fittings.
- Access shall be allowed for maintenance to equipment mounted on or in the desk. Pull out Drawer, Doors or removable panels shall be provided for this purpose.

4.15.2. Chairs

- The chair shall be of high backed design with arm rests, covered in durable woven material.
- The chairs shall be of good quality and suitable for continuous use without discomfort.
- Pneumatic Seat height and back angle adjustments shall be provided, capable of easy operation.

Furniture/Fixtures for all other items which are not mounted in the racks (e.g. printers) shall also be provided by supplier.

4.16. Environmental Conditions

Equipment located in the computer/ control room shall operate over an ambient temperature range of 10°C to 30°C, with a maximum rate of change of 5°C per hour. Relative humidity will range from 20% to 80% non-condensing. Further, all Hardware to be supplied under the project shall be RoHS complaint (Restriction of Hazardous Substance) in Electrical & Electronics Equipment.

4.17. Acoustic Noise Level

The noise level of any equipment located in the server room shall not exceed 60 dBA measurements at three feet from the enclosure. The noise level of equipment located outside the server room shall not exceed 50 dBA three feet from the enclosure. Sound deadening enclosures shall be provided where necessary to meet these requirements.

4.18. General Construction Requirements

The enclosures/panels, used for mounting or placement of equipment, shall be constructed in accordance with the following requirements.

4.18.1. Panels

In case the equipment are mounted in panel type of enclosures, then such enclosures shall be finished inside and out. All cabinet metal shall be thoroughly cleaned and sanded to obtain a clean, smooth finish. All surfaces shall be treated to resist rust and to form a bond between the metal and the paint.

Moving assemblies within the enclosure, such as swing frames or extension slides, shall be designed such that full movement of the assembly is possible without bending or distortion of the enclosure or the moving assembly. Enclosures shall not require fastening to the floor to preclude tipping of the enclosure when the moving assembly is extended. No cables shall be visible, all cables shall be properly clamped, and all entries shall be properly sealed to prevent access by rodents.

Cooling air shall be drawn from the conditioned air within the room. Ducted or directed cooling air to the enclosures will not be supplied by Employer.

All wiring shall use copper conductors. Conductors in multi core cables shall be individually colour coded.

Wiring within the enclosures shall be neatly arranged and securely fastened to the enclosure by non-conductive fasteners. Wiring between all stationary and moveable components, such as wiring across hinges or to components mounted on extension slides, shall allow for full movement of the component without binding or chafing of the wire.

All materials used in the enclosures including cable insulation or sheathing, wire troughs, terminal blocks, and enclosure trim shall be made of flame retardant material and shall not produce toxic gasses under fire conditions.

The finish colours of all enclosures/panels shall be finalized during detailed engineering.

4.18.2. Enclosure Grounding

A safety ground in accordance with Indian standards shall be provided within each enclosure and shall connect to the ground (green) wire of the ac power input.

4.18.3. Interconnections

All signals cabling between component units of the computer systems shall be supplied by the Contractor. Plug type connectors with captive fasteners shall be used for all signal interconnections. The connectors shall be polarized to prevent improper assembly. Both ends of each interconnection cable shall be marked with the cable number and the identifying number and location of each of the cable's terminations. Each cable shall be continuous between components; no intermediate splices or connectors shall be used. Terminations shall be entirely within the enclosure.

4.19. Technical Specification for Hardware

TABLE 4.1: Servers

MDAS, MDM, PLM and other software for analytics:

S.No	Description of the Features	Minimum Quantity of the features
1	Specification	As per the base runtime requirement of CPU 2006 bench marking standards
2	RAM	64 GB (expandable up to 100 %)
3	Internal Auxiliary memory(in RAID-1) configuration	300GB delivered shall be configured in RAID-1 (150 + 150 GB) further expandable up to 600GB hot pluggable
4	External Auxiliary Memory (SAN connectivity at 10 Gbps)	Minimum 5TB effective capacity configured on RAID Level 5 along with required interfaces.
5	Optical Drive	DVD or Blue-ray (R+W)
6	Interfaces	1 Gb dual Ethernet ports
7	Power Supply	Dual AC Power Supply
8	User interface	Through a common TFT monitor, keyboard & mouse

		connected through KVM Switch in a server rack.(IP based)
9	Mounting	Rack mountable

TABLE 4.2: WORKSTATION CONSOLES/REMOTE CONSOLE

S.No	Description of the Features	Minimum Quantity of the features
1	Spec	As per the base runtime requirement of CPU 2006 bench marking standards
2	RAM	8GB
3	Internal Auxiliary memory	150GB delivered, expandable up to 300GB
4	Internal Optical Drive	Blu-ray (R+W)
5	Speakers	Two external speakers
6	Interfaces	1 Gb dual Ethernet ports USB Ports
7	Power Supply	Dual AC Power Supply
8	User interface	Two 24” wide screen (16:9 aspect ratio), HD Resolution (1920x1080) TFT Colour monitors, keyboard & optical mouse
9	Mounting	Desktop mounting

TABLE 4.3: COLOUR MONITORS

TFT Monitor for Work Stations:

S.No	Description of the Features	Minimum Quantity of the features
1	Diagonal Viewable size	24”
2	Colour support	16.7 million
3	On screen control	Required

S.No	Description of the Features	Minimum Quantity of the features
4	Anti glare & anti static	Yes
5	Tilt , Swivel	Yes
6	Aspect ratio	16:9

TABLE 4.4: MONITOR FOR SERVER

S.No	Description of the Features	Minimum Quantity of the features
1	Diagonal Viewable size	17”
2	Colour support	16.7 million
3	On screen control	Required
4	Anti glare & anti static	Yes
5	Tilt , Swivel	Yes
6	Aspect ratio	16:9

TABLE 4.5: FIREWALL

S.No	Description of the Features	Minimum Quantity of the features
1	Specification	8 Ethernet Ports (1gbps) and 4 Fiber Optic Ports
2	Data encryption support	3DES (168 bits), AES 128-, 192-, 256- bit and hashing algorithm like MD5 , SHA-1, IKE, PKI (X.509) and IKEv2 with EAP
3	Support Active-Active mode	Yes
4	High Availability & Load balancing	Yes

5	Support NAT, PAT & Policy based NAT/PAT, Mapped IP (MIP), Virtual IP(VIP) & MIP/VIP grouping	Yes
6	IP address assignment features	PPPoE, DHCP
7	Support VoIP protocols	H.323, SIP, MGCP, SCCP
8	IPv6 features	Syn Cookie, Syn-proxy DoS attack detection, SIP, RSTP, Sun-RPC, ALG's, RIPng, BGP4, DHCPv6 Relay, IPv4 to IPv6 translations & Encapsulations.
9	System management	Using web UI, Command Line interface (console/telnet/SSH).
10	Filtering of packets based on Source address, destination address, protocol type, user, port number, URL.	Yes
11	Filtering of protocols	FTP, SMTP, HTTP, HTTPS, SNMP, UDP, ICMP, RPC, DNS, DHCP, ARP, TCP, POP3
12	Authentication protocols	RADIUS, LDAP and PKI methods
13	Dynamic routing protocols	RIP v2, OSPF, & BGP
13	DoS & DDoS prevention	Yes
14	TCP reassemble for fragmented packet protection	Yes
15	Brute Force attack mitigation	Yes
16	SYN cookie protection	Yes
17	Zone based IP spoofing	Yes

18	Malformed packet protection	Yes
19	DNS guard features	Yes
20	Content filtering	JAVA & ActiveX blocking
21	Antivirus, anti-worm, anti-spam and anti-spyware protection	Yes
22	System Logging & monitoring	Syslog, Email, SNMPv2 and VPN Tunnel Monitor.
23	Stateful packet inspection	Yes
24	Assign zones to virtual & physical interfaces	Yes

SIZING PARAMETERS FOR EACH FIREWALL:

S.No	Description of the Features	Minimum Quantity of the features
1	No. of unique users	Unlimited
2	Minimum number of concurrent sessions	500
3	Minimum new sessions per second processing	500
4	Minimum Firewall throughput	1 Gbps
5	Minimum 3DES/AES VPN throughput	250 Mbps
6	No of VLANs	100
7	Minimum IPSec VPN peers	100

8	Number of 1 Gbps LAN ports	12

TABLE 4.6: ROUTER

S.No	Description of the Features	Minimum Quantity of the features
1	Functions	High performance Routing for data exchange between data centres, remote WorkStation, DCU, Internet cloud.
2	Routing Capability	Layer -2 & Layer-3 routing & Dynamic discovery of routing
3	Processing capacity	Minimum 2 Mbps
4	Features to support	QoS, MPLS, Security, Broadband, Multiservice, Voice, IP to IP Gateway
5	Routing protocols	EIGRP, IGRP, IS-IS, OSPF, BGP, ARP, IPCP, IP forwarding, VLAN & MPLS etc.
6	Network protocols	TCP/IP, IPv6, IPv4, OSI, Telnet, UDP, DHCP
7	Network management	Using SNMP Protocol
8	Inbuilt security features	a. Data encryption supported DES (56 BITS), 3DES (168 bits) and hashing algorithm like MD5 and SHA-1 b. Filtering of packets based on Source address, Destination address, Protocol type, User, Port number, URL c. Filtering of Protocols such as FTP, SMTP, HTTP, SNMP, UDP, ICMP, RPC, DNS, DHCP, ARP d. Minimum 100 IPSec VPN tunnels support e. Detailed system logging
9	Speed configurability at each port	All ports shall be configurable from 64kbps to 2Mbps
10	Interface ports	1000 Mbps LAN ports – 2 V.35/G.703 Ports as per the system requirement. There

		shall be 50% spare ports.
11	Mounting	Rack mountable

TABLE 4.7: PANELS-42 U RACK

S.No	Description of the Features	Minimum Quantity of the features
1	Functions	For mounting or placement of equipment
2	Mounting	Floor mounted with front & rear access to hardware and wiring
3	Cable entry	Bottom
4	Internal lighting lamp	Yes, with door interlock
5	230V AC, 15/5 A Internal power socket with switch	12
6	All material used in the panel are flame retardant	Yes
7	All Louvers provided with suitable wire mesh	Yes

TABLE 4.8: SWITCH

Servers and peripheral devices are connected to each other on a local area network (LAN). Dual LAN is envisaged for the System.

S.No	Description of the Features	Minimum Quantity of the features
1	Functions	24 ports for connecting Workstation, servers, screen & peripheral devices on Local Area Network (LAN).
2	Conform to standards	ISO8802 or IEEE 802 Series Standards
3	Switching capability	Layer-3 switching & VLAN
4	Interface ports	** Minimum 8- 1Gbps Ethernet ports

5	Cable standard	Cat 6 or higher bandwidth cable
6	Mounting	Rack mountable

***** However, the no of ports in a LAN switch shall be as per the network architecture & the no of servers/devices on that LAN.***

TABLE 4.9: SAN (Storage Area Network) Based Storage

S.No	Description of the Features	Minimum Quantity of the features
1	Capacity	Minimum 5 TB usable
2	Spare HDD	1 Nos.
3	Expandability	100%
4	RAID level	5
5	SAN Type(10 Gbps connectivity with server))	iSCSi
6	Snapshot feature	Yes
7	Hard Drives speed	15000 rpm
8	Hot swappable Hard Drives	Yes
9	Interface ports	Dual LAN (Gigabit ports)
10	NAS Support	Yes
11	High Availability Mode(Dual Controller)	Yes
12	Dual Power Supply	Yes
13	SAN Switch	Minimum 24 ports

TABLE 4.10: COLOUR LASER PRINTER

Sr .No	Description of the Features	Minimum Quantity of the features
1	Functions	Print
2	Paper size	A3, A4
3	Print speed	30 Colour pages/minute of A4 size & 15 Colour pages/minute of A3 size.
4	Print resolution	1200x1200 dpi
5	Paper weight	75-200 GSM
6	First page out time	4 sec for Black & White, 7 sec for Colour
7	Duty cycle	100000 pages per month
8	Paper handling capacity	Minimum 500 sheets for input tray & 500 sheets for output tray.
9	Landscape and portrait orientation	Yes
10	Interface	1GB dual LAN ports

TABLE 4.11: BLACK & WHITE LASER PRINTER (MULTIFUNCTION DEVICE)

S.No	Description of the Features	Minimum Quantity of the features
1.	Functions	i. Print, ii. Scan iii. Copy iv. Fax
2.	Paper size	A3, A4
3.	Print speed	30 pages/minute of A4 size & 15 pages/minute of A3 size.

4.	Print resolution	1200x1200 dpi
5.	Scan resolution	600x600 dpi
6.	Paper weight	75-200 GSM
7.	First page out time	4 sec
8.	Duty cycle	100000 pages per month
9.	Paper handling capacity	Minimum 500 sheets for input tray & 500 sheets for output tray.
10.	Automatic Duplex printing	Yes
11.	Landscape and portrait orientation	Yes
12.	Interface	1GB dual LAN ports

TABLE 4.12: GPS BASED TIME FACILITY

S.No	Description of the Features	Minimum Quantity of the features
1.	Time stability of internal time base	Minimum 2ppm
2.	Propagation delay compensation	Yes
3.	Include an offset to permit correction to local time	Yes
4.	Reverting to internal time base upon loss of signal from UTC source	Yes
5.	Resynchronization Delay	Not more than 5 minutes.
6.	Accuracy of resynchronization	< 1.5 Micro Sec
7.	Interfaces	Ethernet ports - 2 IRIG-B port - 2

TABLE 4.13: DIGITAL DISPLAYS FOR GPS BASED TIME FACILITY

S.No	Description of the Features	Minimum Quantity of the features
1.	Functions	For viewing UTC day of the year and time and frequency
2.	Day display format	XXX (MON through SUN)
3.	Time Display format	24 Hours, HH:MM:SS, where hour display will be from 00 to 23 hours format.
4.	Date format	MM: DD: YY
5.	Frequency display format	XX.XX Hz
6.	Display digit requirements	Display Digit height >7.5cm
7.	Mounting of displays	Wall/panel mounting
8.	SCADA Interfaces	Frequency

---------- End of this Section ----------

Section-5

Software Requirements

Section 5. Software Requirements

5.1. General Requirements

This section describes the characteristics of system software such as Operating system, Database and support software (Programming Language Compilers, Database Development And Maintenance, Display Development, Network Services, Report Generation, Diagnostics And Backup Utilities) provided by Contractor and the original software manufacturer as necessary to support the applications of AMI/MDM/PLM system. This section also describes the standards to be followed for all supplied software.

5.2. Software Standards

All software of AMI/MDM/PLM system provided by the Contractor, including the Operating system, Database and support software, shall comply with the industry-accepted software standards. In areas where these organizations have not yet set standards, the software shall comply with those widely accepted de- facto open standards put forth by industry consortiums, such as OSF and X/Open. The Contractor shall commit to meet the "open systems" objective promoted by industry standards groups.

5.3. Design and Coding Standards for AMI/MDM/PLM

5.3.1. Applications

All applications of AMI/MDM/PLM system shall be maintainable by owner using the supplied software utilities and documentation. The software design and coding standards of AMI/MDM/PLM system shall address the followings:

1) **Expansion:** Software shall be dimensioned to accommodate the size of AMI/MDM/PLM system as given in BOQ and **Appendix-D**.(Separate sheet for Sizing)
2) **Modularity:** Software shall be modular i.e. functionally partitioned into discrete, scalable, reusable modules consisting of isolated self contained functional elements and designed for ease of change. The system shall make maximum use of common industry standards for interfaces.
3) **User-Directed Termination:** Functions taking long execution times shall recognize and process user requests to abort the processing.
4) **Portability & Interoperability:** The system shall be designed for hardware independence and operation in a network environment that facilitates interoperability and integration of third party applications. AMI/MDM/PLM should support multiple RDBMS systems including Oracle, Microsoft SQL Server and MySQL.
5) **Programming languages:** The software shall be written using high level ISO or ANSI standard programming languages.

5.3.2. Operating System

The operating system of all the equipment of AMI/MDM/PLM system including network equipment shall be latest version released up to six months prior to FAT. The operating system shall be hardened to provide robust security. The operating system and data file shall be placed in different disk partition.

In order to facilitate cyber security requirements including patch management, common operating system is preferable to be used by all server nodes within the AMI/MDM/PLM including MDM and MDAS servers. This is also to minimize the maintenance .All licences for Operating System and other application software shall be supplied by the contractor.

5.3.3. Time and Calendar Feature

The MDAS, MDM and other servers shall maintain Time and calendar for use by various software applications. A GPS based time reference shall be used for synchronising these systems periodically. The internal clocks of all Servers and workstation consoles shall be automatically synchronised within the accuracy of +/-100 milliseconds of synchronised GPS time on NTP protocol. The calendar shall be customizable for working hours, holidays, weekends etc. The holidays, including type of days, shall be entered for each year at the beginning of the year and shall be recognised by all applications.

The Contractor-furnished GPS based Time facility shall be read and compared to the time and date maintained by the time and calendar function at least every fifteen minutes. The difference in time shall be alarmed. The user shall be able to alter the date and time. The alteration shall not adversely affect the programs running at the beginning of the hour.

5.3.4. Network Software

The network software system shall include software for network communication, network security and network services. Network software shall include the user node software that provides the connection of that node to the network. The network node software shall be provided for each type of network node connection supplied with the initial system and shall be licensed for the quantities and types of nodes defined in the system configuration.

5.3.5. Network Communication

Users and various applications shall be able to communicate within the local area network and operate as described in this Specification. The network communications software shall use a standard network protocol such as TCP/IP. The software shall link dissimilar hardware nodes such as local and remote workstations, servers, and peripheral devices into a common data communication network allowing communications among these devices.

5.3.6. System Security

As the computer system in control centre has access to external environment through GPRS and internet cloud the Contractor shall document and implement Cyber Security Policy/Plan in

association with the Employer to secure the system. The overall policy and implementation shall account for:

- Network partition and DMZ through use of Firewall as required to maximise the security of AMI/MDM/PLM system while facilitating access for data and information to all stake holders.
- Implement trusted un-trusted and DMZ with clear perimeter.
- Prevent unauthorised users from reading or writing data or files, executing programs or performing operations without appropriate privileges.
- Document all user sign on procedure
- Auditing by third party during FAT, SAT and annually during AMC period shall be in the scope of contractor.
- Record all network traffic for detecting unauthorised activity, unusual activity and attempts to defeat system security (Contractor to propose and document what constitutes normal activity/traffic)
- A user authentication scheme consisting at least of a user identification and password shall be required for the user to request a connection to any network node.

5.3.7. Access Control

Identity and access management system should be installed to control and log the access control for all users. The access management system shall be role based. Access Control shall not be integrated with RAPDRP System.

Security Management System to protect systems and network from unauthorised access, manage user access, authorising rights and privileges to be provided.

5.3.8. Remote Diagnostic

Remote Diagnostic facility with necessary Hardware as required shall be provided for communication between the AMI/MDM/PLM system at control center and the Contractor's & Employer support office for the diagnosis of Hardware & Software problems. The login shall be protected by a user name & password entry.

5.3.9. Network services

The following network services shall be provided for the users of AMI system within the LAN:

1) Network file management and transfer of files containing text, data, and graphics information
2) Network printing management
3) Network time synchronization

4) Backup over LAN(Storage Area Network)
5) Task-to-task communications to external computers
6) LAN global naming facilities.
7) Remote procedure call
8) Remote terminal session

5.3.10. Network Management system (NMS)

The Network management system shall facilitate following activities:

-
- Inventory Management to collect information about computers in the system such as processors, memory, peripherals and processes running on computers.
- Performance Management to monitor system and network performance as specified.
- Fault Management to recognise, isolate, log and identify fault on network and connected machines, nodes, devices.

The network management software shall be based on the latest secured version of Simple Network Management Protocol ver. 3.0 (SNMPv3). The NMS system shall have a simple browser based user interface to provide all the pertinent information about the system. The NMS shall not impact the availability and performance of AMI/MDM/PLM and shall load not more than 3% any host CPU, 1% Network bandwidth and shall have secure communication.

The Network management system shall monitor the performance, resource usages and error statistics of all the servers, workstations, routers and LAN devices including for proposed Employer networks extension (up to 25 number of nodes) including the following:-

1) Utilisation (CPU and/or channel time being used as applicable) for
   a) Servers, Workstations, Storage Devices (SAN, HDD, etc.)
   b) LAN, Firewalls(internal & External),Router, Switches
   c) Data Links
2) Memory utilisation, Auxiliary memory I/O utilisation, of
   a) Servers and Other Machines
   b) Mass Storage Devices

The Network Management Software shall:

1) Maintain performance, resource usage, & error statistics and present this information via displays, periodic reports, and on-demand reports.
2) Apart from real-time monitoring, the above information shall be collected and stored at user configurable periodicities i.e. 5 minutes to 60 minutes. The Network Management System (NMS) shall be capable of storing the above data for a period of one (1) year at a periodicity of 5 minutes.

3) Maintain a graphical display for connectivity and status of servers and peripheral devices for local area network.

4) Issue alarms when error conditions or resource usage problems occur.

5) The period over which the statistics are gathered shall be adjustable by the user, and the accumulated statistics shall be reset at the start of each period.

6) The statistics shall be available for printout and display after each period and on demand during the period.

5.3.11. Database development tools

The Contractor shall provide all necessary software tools for the development and maintenance of the AMI/MDM/PLM databases at Control Centre.

This tool shall be capable of managing the entire system database. The database development software tool delivered with the system shall be used to generate, integrate and test the database.

The system must support export of data into XML format.

The database development tool shall facilitate exchange of both Incremental and full data in standard exchange format. The bidder shall submit the format along with bidding. The product should have facility to export and import databases from different vendors applications.

5.3.12. Database Management

The database manager shall locate order, retrieve, update, insert, and delete data; ensure database integrity; and provide for backup and recovery of database files. The database manager shall generate and modify all AMI/MDM/PLM data by interfacing with all database structures. In systems with a distributed database, the database manager shall have access to all portions of the database wherever stored. The location of database items shall be transparent to the user performing database maintenance.

Execution of the database manager in any server of the system shall not interfere with the on-line functions of AMI/MDM/PLM including the normal updating of each server's real-time database. In a primary server, database editing shall be limited to viewing functions, database documentation functions, and functions that change the contents but not the structure of the database. Editing the on-line database shall not affect the operation of the primary/backup configuration.

The database manager shall include the mechanisms, in both interactive and batch processing modes, to perform the following functions:

1) Add, modify, and delete database items and data sources such as data links, and local I/O.

2) Add, modify, and delete application program data

3) Create a new database attribute or new database object

4) Resize the entire database or a subset of the database

5) Redefine the structure of any portion of the database.

The contractor will need to clarify whether they require or impose any particular hardware and database management techniques or other requirements.

5.3.13. Database Integration

The System should support exchange of data from Utility's computerized billing & collection, Consumer Indexing and asset mapping systems residing at different servers.

5.3.14. Tracking Database Changes

The database manager utility shall maintain Audit trail files for all changes made by all users (both online/off-line). The audit trails shall identify each change including date and time stamp for each change, and identify the user making the change. An audit trail of last 10,000 edit operations shall be maintained.

5.3.15. Initial Database Generation

The Contractor shall be responsible for the initial database generation using data available at control centre in association with the employer.

5.3.16. Development System as a Test Bench

Development system shall be able to provide testing facility for integration of new, AMI/MDM/PLM devices before putting it online with Real-time system.

5.4. Database and Display Generation and Management

The Contractor shall provide necessary software tools preferably browser based for the generation and management of AMI/MDM/PLM displays.

The displays shall be generated and edited interactively using this display generation software delivered with the system.

All displays, symbols, segments, and user interaction fields shall be maintained in libraries. The size of any library and the number of libraries shall not be constrained by software. The display generator shall support the creation, editing, and deletion of libraries, including copying of elements within a library and copying of similar elements across libraries.

Displays shall be generated in an interactive mode. The user shall be able to interactively:

1) Develop display elements

2) Link display elements to the database via symbolic point names

3) Establish display element dynamics via database linkages

4) Define linkages to other displays and programs

5) Combine elements and linkages into display layers

6) Combine display layers into displays.

Execution of the display generator functions shall not interfere with the on-line AMI/MDM/PLM functions.

All workstation features and all user interface features defined in this Specification shall be supported by the display generator software. An audit trail of all interactive generations and edits shall be maintained by the display generator software. An audit trail of last 10,000 edit operations shall be maintained.

The display generator shall support the addition, deletion, and modification of segments, including the merging of one segment with another to create a new segment.

5.4.1. Display Generation and Integration

The displays shall be constructed from the display elements library. The display definition shall allow displays to be sized to meet the requirements of the AMI/MDM/PLM application for which they are used; displays shall not be limited by the size of the viewable area of the screen. The display generation software shall allow unbroken viewing of the display image being built as the user extends the size of the display beyond the screen size limits. Each display shall include the display coordinates definition that will permit a user to navigate successfully to the portion of the display that is of interest.

It shall be possible for a user to build a new display starting with a blank screen, a DXF formatted file imported from another system, GIS mapping file, or any existing display. Graphic display shall consist of multiple display layers. The definition of each layer shall include a range of scale factors over which the layer shall be visible. The display generator shall also support manual control of layer visibility, where the user of the display shall determine the layers on view. Each display may incorporate manually and automatically (by scale factor) displayed layers. The user shall also define the periodic update rate of the dynamic information on the display and any programs called before or after presentation of the display.

The display generator shall support the integration of new and edited displays into the active display library. During an edit session, the display generation software shall allow the user to store and recall a partial display. To protect against loss of display work when a server fails, the current work shall be automatically saved every five minutes (user adjustable) to an auxiliary memory file.

The display generator shall verify that the display is complete and error-free before integrating the display into the active display library. It shall not be necessary to regenerate any display following a complete or partial system or database generation unless the database points linked to the display have been modified or deleted.

The system shall generate reports for all the modules in user-defined formats. The system will have a graphical user interface with a capability for generating customized reports, apart from the regular ones mentioned above, as per the requirement of management and operations staff.

Display of statistical data shall be presented additionally in graphical formats such as bar-graph/pie diagram etc. for convenience of analysis.

5.5. Software Utilities

Some of the software utilities, which are required to be delivered along with the AMI/MDM/PLM, are described here. However Contractor shall supply all software utilities used to develop and maintain these software, whether or not specifically described by this Specification.

The software utilities shall operate on-line (in background mode) without jeopardizing other application functions those is running concurrently. Utility software shall be accessible from workstations, processor terminals and servers.

5.5.1. Auxiliary Memory Backup utility

Software utility, to take back-up of auxiliary memory files of server and workstation onto a user-selected archival device such as magnetic tape or SAN on Network, shall be installed. Backup shall be maintained for a period of 3 years.The backup utility shall allow for user selection of the files to be saved based on:

1) Server and workstation
2) File names (including directory and wildcard designations)
3) File creation or modification date and time
4) Whether or not the file was modified since the last backup.

Further a utility for taking image backup of auxiliary memory files of the Servers and workstations shall be provided. The utility shall allow restoration of the servers/workstation from this image backup without requiring any other software. An image backup of the as built system of each of the Servers and workstations shall be provided on a user-selected archival device such as magnetic tape or SAN on Network, which shall be used to restore the system. Automatic full or incremental back up capability of selected systems at user defined intervals shall be provided. It should be possible to restore or recover any software/system at a selected time form backup.

5.6. On-Line Monitoring Diagnostics

On-Line monitoring diagnostic programs shall be provided for verifying the availability of the backup equipment and for limited testing of devices without interfering with on-line operations of AMI/MDM/PLM system or the failover capability of the devices.

Redundant communication line interface equipment shall be tested by periodically retrieving data over these lines and checking for the ability to communicate with the redundant channel and for any errors.

Designated backup server(s) and associated auxiliary memories shall be automatically tested for proper operation to ensure they are ready if needed for a fail over contingency. Any failure to perform diagnostic functions correctly shall cause an alarm to be issued.

5.7. Data Exchange Utilities

The facility for data backup through file management utility to transfer data on request to external portable storage shall be provided on the server with proper software support..Facility of data export and import from and to this system to external system shall be provided as detailed below:

5.7.1. Data exchange through WEB services

System should be capable to exchange data through WEB services.

5.8. Other Utility Services

AMI/MDM/PLM Management shall include the following utility services:

1. Loading and storage of information from labeled portable media storage units as dictated by the requirements of this Specification.
2. The contractor shall provide utilities for preparing the pdf output for the displays/reports available in the AMI/MDM/PLM system. It should also be possible to export all the reports to any MS-Office format.
3. Displays and Reports for Web server -The Contractor shall provide utilities for preparing displays and reports suitable for Web publishing. These utilities shall be used to generate, all required displays and reports from the system displays and reports, automatically (without requiring rebuilding).
4. Antivirus Software-All computers and firewalls shall be provided with the latest antivirus software as on date of supply. The antivirus software shall have the capability of having its virus definitions updated from time to time. The Contractor shall be responsible for the maintenance & update of the antivirus software during AMC period.
5. Software Upgrade-The Contractor shall be responsible for the maintenance & update of the patches and signatures of Operating system, applications (AMI/MDM/PLM) system and Web System up to AMC period.

6. Automated patch management tools shall be provided to expedite the distributions of patches to the system. These tools should consider the possibility to use standardized configurations for IT resources.

5.9. Device Configuration of Network Equipment

The device configuration of all the network equipment shall be as per the latest Cyber Security guidelines given by **CERT-In.**

5.9.1. Firewall

Firewalls should be properly configured to segregate networks into different segments. The following strategies shall be followed for secure configuration of firewalls.

- Cleanup rule.
- Place a 'Deny Any-Any' rule at the end of the rule base.
- Never create an 'Allow any-any' rule.
- Allow rules should be created only for required services.
- This will result in all traffic being disallowed, unless specifically allowed.
- Lockdown/stealth rule
- All traffic destined for the firewall itself should be disallowed.
- Anti-spoofing rule.
- Place anti-spoofing rule as per RFC 1918 and 2827.
- Enable DoS/DDoS features on Firewall
- Enable application level filtering of firewall

5.9.2. Router

Necessary control should be applied on the router to stop unwanted traffic and attacks at the perimeter itself. In the secure configuration of a router, the following strategies should be considered.

- Deploy proper access management and avoid remote administration.
- Enable secret password.
- Change default SNMP community string.
- ACLs (Access Control Lists) should include
    - Apply egress/ingress filter
    - Filter all RFC 1918, 3330 address space and special/reserved address
    - Permit the required services for the required IP addresses only

- Deny everything else.

- Turn on logging to a central syslog server.

5.9.3. Intrusion Detection & Prevention System

The required features of the Host Based Intrusion Detection Systems (HIDS) and Network based Intrusion Prevention System (NIPS) are described below:

5.9.3.1. Intrusion Detection and Prevention System (Host Based)

Host based Intrusion Detection and Prevention System module shall be provided for all machines. IDS shall be able to perform following actions:

- Capability for Detecting the intrusion attempt that may take place, intrusion in progress and the intrusion that has taken place.
- Flag and check unauthorized access
- Notify/Alarm/message of intrusion to:
  - Management console
  - Event log
  - Administrator by e-mail
- Create an audit trail for user and file access activity, including file accesses, changes to file permissions, attempts to install new executables and/or attempts to access privileged services
- In an event where user accounts are added, deleted, or modified, changes to key system files and executables is done in by unauthorized account or there is unauthorized attempt to overwrite vital system files, to install Trojan horses or backdoors suitable action should be taken such as:
  - Terminate User (intruder) Login
  - Disable User (intruder) Account
  - Forge a TCP FIN packet to force intruder connection to terminate
- Should provide events check for suspicious file transfers, denied login attempts, physical messages (like an Ethernet interface set to promiscuous mode) and system reboots.

5.9.3.2. Network based Intrusion Prevention System (NIPS)

The NIPS shall provide complete inline protection from network-based application layer threats by scanning packet payloads for malicious traffic. It shall detect, classify and stop malicious application, viruses, worms and spyware/adware etc.

After detecting an intrusion attempt NIPS should be able to perform following actions:

- Reconfigure the firewalls provided in this package
- Send an SNMP Trap datagram to the management console.

- Send an event to the event log.
- Send e-mail to an administrator to notify of the attack.
- Save the attack information (timestamp, intruder IP address, victim IP address and port, protocol information)
- Force intruder connection to terminate.

5.10. Cyber Security

The following guidelines/strategies shall be taken care of by the Contractor for making the entire Control Centre immune to Cyber Attacks.

- All the Hardware, OS and application software shall be hardened.
- Network Zoning shall be implemented as per the proposed architecture. However, the Contractor may suggest other methods of network architecture without compromising the security of the System.
- No user shall be allowed to access remote network zones other than the adjacent zone.
- All default user id & passwords shall be changed.
- All log in/out and cable plugs in/ out shall also be logged in Central Syslog server.
- Penetration & Vulnerability assessment test from certified auditors during FAT, SAT & AMC.
- Latest Cyber Security Guidelines of **CERT-In specified at** http://www.cert-in.org.in shall be followed.

----------End of this Section ----------

Section 6

Inspection Testing and Operation Acceptance

Section 6. Inspection, Testing and Operation Acceptance

6.1. General

All materials and parts of the system/sub-system to be supplied under the project shall be of current manufacture and from a supplier regularly engaged in the production of such equipment.

6.2. Quality Assurance and Quality Control Program

The Contractor shall maintain a Quality Assurance/Quality Control (QA/QC) program that provides that equipment, materials and services under this specification whether manufactured, designed or performed within the Contractor's plant or at any sub-contractor source shall be controlled at all points necessary to assure conformance to contractual requirements. The program shall provide for prevention and ready detection of discrepancies and for timely and positive corrective action. The Contractor shall make objective evidence of quality conformance readily available to the Employer. Instructions and records for quality assurance shall be controlled and maintained at the system levels. The Contractor shall describe his QA/QC program in the Technical Proposal, (along with samples from his QA/QC manual) and shall submit his QA/QC Manual for review and acceptance by the Employer.

Such QA/QC program shall be outlined by the Contractor and shall be finally accepted by Employer after discussions before the award of Contract. A Quality Assurance Program of the Contractor shall generally cover but not be limited to the following:

1) The organization structure for the management and implementation of the proposed Quality Assurance Program.
2) Documentation control system.
3) Qualification data for key personnel.
4) The procedure for purchase of materials, parts/components and selection of sub-contractor's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases, etc.
5) System for shop manufacturing including process controls.
6) Control of non-conforming items and system for corrective action.
7) Control of calibration and testing of measuring and testing equipment.
8) Inspection and test procedure for manufacture.
9) System for indication and appraisal of inspection status.
10) System for quality audits.

11) System for authorizing release of manufactured product to WBSEDCL

12) System for maintenance of records.

13) System for handling, storage and delivery.

14) A Quality Plan detailing out the specific quality control procedure adopted for controlling the quality characteristics of the product.

The Quality Plan shall be mutually discussed and approved by the Employer after incorporating necessary corrections by the Contractor as may be required. Neither the enforcement of QA/QC procedures nor the correction of work mandated by those procedures shall be cause for an excusable delay. An effective Quality Assurance and Quality Control procedure shall be maintained by the Contractor for at least the duration of this Contract. The personnel performing QA/QC functions shall have well-defined responsibility, authority, and organizational freedom to identify and evaluate quality problems and to initiate, recommend, or provide solutions during all phases of the Contract. The Contractor shall be required to submit all the Quality Assurance Documents as stipulated in the Quality Plan at the time of Employer's inspection of equipment/materials.

6.3. Scope of duties of Employer

The Employer or his duly authorized representative reserves the right to carry out Quality Audit and Quality Surveillance of the systems and procedures of the Contractor's/his vendor's Quality Management and Control Activities.

The scope of the duties of the Employer, pursuant to the Contract, will include but not be limited to the following:

1) Review of all the Contractor's drawings, engineering data etc.

2) Witness or authorize his representative to witness process, tests at the manufacturer's works or at site, or at any place where work is performed under the Contract.

3) Inspect, accept or reject any equipment, material and work under the Contract in accordance with the specifications.

4) Issue certificate of acceptance

5) Review and suggest modification and improvement in completion schedules from time to time

6) Monitor the Quality Assurance program implementation at all stages of the works.

6.4. Inspection Certificate

The Contractor shall give the Employer two weeks in case of domestic supplies and six weeks in case of foreign supplies written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The

Employer, unless witnessing of the tests is waived, will attend such tests on the scheduled date for which Employer has been so notified or on a mutually agreed alternative date.

The Employer shall, within fourteen (14) days from the date of inspection as defined herein, give notice in writing to the Contractor of any objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the Contract. The Contractor shall give due consideration to such objections and shall make the modifications that may be necessary to meet said objections. When the factory tests have been completed successfully at the Contractor's or Sub-contractor's works, the Employer shall issue a certificate to this effect within fourteen (14) days after completion of tests but if the tests are not witnessed by the Employer, the certificate shall be issued within fourteen (14) days of receipt of the Contractor's Test Certificate by the Employer. The completion of these tests or the issue of the certificates shall not bind the Employer to accept the equipment should it, on further tests after erection, be found not to comply with the Contract.

In cases where the Contract provides for tests, whether at the premises or works of the Contractor or of any Sub-contractor, the Contractor except where otherwise specified shall provide free of charge items such as labor, materials, electricity, fuel, water stores, apparatus and instruments, as may be reasonably demanded by the Employer or his authorized representative to carry out effectively such tests of the equipment in accordance with the Contract and shall provide facilities to the Employer or his authorized representative to accomplish testing. The contractor shall borne the full expense of at most 2 representatives from WBSEDCL for witnessing of each test.

The inspection by Employer and issue of Inspection Certificate thereon, shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Program forming a part of the Contract.

The Contractor shall keep the Employer informed in advance of the time of starting of the progress of manufacture of material in its various stages so that arrangements can be made for inspection.

Record of routine test reports shall be maintained by the Contractor at his works for periodic inspection by the Employer's representative.

Certificates of manufacturing tests shall be maintained by the Contractor and produced for verification as and when desired by the Employer. No material shall be dispatched from its point of manufacture until it has been satisfactorily inspected and tested. Testing shall always be carried out while the inspection may be waived off by the Employer in writing only.

However, such inspection by the Employer's representative(s) shall not relieve the Contractor from the responsibility for furnishing material, software, and equipment to conform to the requirements of the Contract; nor invalidate any claim which the Employer may make because of defective or unsatisfactory material, software or equipment.

6.5. Inspection and Test

All materials furnished and all work performed under this Specification shall be inspected and tested. Deliverables shall not be shipped until all required inspections and tests have been completed, all deficiencies have been corrected to Employer's satisfaction, and the equipment has been approved for shipment by Employer.

Any inspections or tests indicate that specific hardware, software or documentation does not meet the Specification requirements, the appropriate items shall be replaced, upgraded, or added by the Contractor as necessary to correct the noted deficiencies. After correction of a deficiency, all necessary retests shall be performed to verify the effectiveness of the corrective action.

The test shall be considered complete when (a) all variances have been resolved and all variance report submitted (b) all the test records have been submitted (c) Employer acknowledges in writing the successful completion of the test.

6.5.1. Inspection

Access to the Contractor's facilities while manufacturing and testing are taking place, and to any facility where hardware/software is being produced for Employer shall be available to Employer representatives. The Contractor shall provide to Employer representatives sufficient facilities, equipment, and documentation necessary to complete all inspections and to verify that the equipment is being fabricated and maintained in accordance with the Specification. Inspection rights shall apply to the Contractor's facilities and to subcontractor facilities where equipment is being manufactured. The contractor shall borne the full expense of at most 2 representatives from WBSEDCL for inspection related activities.

Inspections will be performed by Employer, which will include visual examination of hardware, enclosure cable dressings, and equipment and cable labelling. Contractor documentation will also be examined to verify that it adequately identifies and describes all wiring, hardware and spare parts. Access to inspect the Contractor's hardware quality assurance standards, procedures, and records that are applicable to the facilities shall be provided to Employer.

6.5.2. Test Plans & Procedures

Test plans for both factory and field tests shall be provided by the Contractor to ensure that each test is comprehensive and verifies all the features of the equipment are tested. The test plans for factory and field tests shall be submitted for Employer approval before the start of testing.

The contractor shall prepare detail testing procedure in line to specification and submit for Employer's approval. The procedure shall be modular to the extent possible, which shall facilitate the completion of the testing in the least possible time.

6.5.3. Test Records

The complete record of all factory and field acceptance tests results shall be maintained by the Contractor. The records shall be maintained in a logical form and shall contain all the relevant information. The test reports shall be signed by the testing engineer and the engineer witnessing the tests.

6.5.4. Reporting of variances

A variance report shall be prepared by either Employer or Contractor personnel each time a deviation from specification requirements is detected during inspection or testing. All such variances shall be resolved in mutually agreed manner including retesting.

However, at any stage if Employer feels that quality of variances calls for suspension of the testing, the testing shall be halted till satisfactory resolution of variances, which may involve retesting also.

6.5.5. Factory Test

The factory tests shall be conducted on all the equipment and shall include, but not be limited to the following, appropriate to the equipment being tested:

1) Verification of all functional characteristics and requirements specified
2) Inspection and verification of all construction, wiring, labeling, documentation and completeness of the hardware

Before the start of factory testing, the Contractor shall verify that all changes applicable to the equipment have been implemented. As a part of the factory tests, exploratory/contra testing shall be performed to allow Employer representatives to verify proper operation of the equipment under conditions not specifically tested in the above structured performance test. The Contractor's test representative shall be present and the Contractor's technical staff members shall be available for consultation with Employer personnel during exploratory/contra test periods. All special test facilities used during the structured performance test shall be made available for Employer’s use during exploratory/contra testing.

6.5.5.1. Factory Test Requirements

The data base, web based user interface displays ,consumer portal and the report formats developed by the contractor shall be demonstrated and verified by the employer before factory testing.

All AMI Infrastructure field devices(Smart meters, DCUs), MDAS , MDM & PLM functionalities ,communication & networking system as well as performance of the system shall be tested and demonstrated for redundant hardware and software configuration. The Employer will participate in and witness these tests.

The contractor shall also carry out testing of their standard protocol and interfaces from Meter to DCU/MDAS and other functionalities like MDM, PLM for successful integration with existing system of employer before FAT starts. The database and the report formats developed by the contractor for Control Center shall be verified by the employer before factory testing.

The control centre redundant hardware and software architecture shall be staged and completely tested with simulated data at the Contractor's facility. The Material Inspection and Clearance Certificate (MICC) for all hardware shall be issued only after successful completion of FAT as per specification. At least 10 meters of proposed protocol along with DCU shall be connected with control centre MDAS and the remaining meters shall be simulated in the factory test environment for data exchange.

The employer shall witness all tests and will not accept un-witnessed test results. Each of the factory tests described below (i.e. the hardware integration test, the functional performance test, and the integrated system test, unstructured tests) shall be carried out under factory test.

6.5.5.2. Hardware Integration Test

The hardware integration test shall confirm that the computer hardware conforms to this Specification and the Contractor-supplied hardware documentation. The hardware integration test shall be performed when the computer hardware has been installed in the Contractors factory. The operation of each item shall be verified as an integral part of the system. Applicable hardware diagnostics shall be used to verify that each hardware component is completely operational and assembled into a configuration capable of supporting software integration and factory testing of the system. Equipment expansion capability shall also be verified during the hardware integration test.

6.5.5.3. Functional Performance Test

The functional performance test shall verify all features specified in AMI/MDM/PLM technical specifications along with hardware and software. As a minimum, the following items shall be included in the functional performance test:

1) Simulation of field devices (smart meter & DCU) ,communication link & failures from Meter to DCU and from DCU to MDAS, data link communication errors, communication failures, including incorrect check codes and random channel noise bursts
2) Simulation of network errors along with failure conditions.
3) Verifications of field devices errors, communication errors, interface errors at control centre.
4) Simulation of hardware and software failure to verify the redundancy requirements.
5) Input power supply failure to device, hardware to verify system behavior.
6) Demonstration of all features of software functionalities as per Technical Specification.

7) Verification that the computer system meets or exceeds employer's performance requirements through hardware diagnostics.
8) Verification of User Interface displays and reports

6.5.5.4. Integrated System Test

Integrated system test shall be performed after successful completion of functional performance test. During the integrated system test, all AMI/MDM/PLM functions shall run concurrently and all Contractor's supplied equipment shall operate for a continuous 100-hour period. The test procedure shall include 100 concurrent user accessing consumer portal. This minimum level of activity during this period shall be as per the discretion of employer. These other activities may include, but shall not be limited to, database, display, and report modifications, software development activities, configuration changes (including user-commanded server and device failovers), and the execution of any function described in this Specification.

The integrated system test shall assure employer that the computer system is free of improper interactions between software and hardware while the system is operating as an integrated unit. In case during the 100 hour period testing uncommented functional restart or server or device fail occurs the test shall be extended by 24 hours each time such a fail over occurs. Further the test shall not be conducted with the failed device.

6.5.5.5. Unstructured Test

Employer representative can carry out unstructured test not specified in the test procedure. Minimum 25% of the actual time shall be kept reserved for unstructured test. Contractor's representative shall carry out such test at employer's discretion but after the completion of functional test.

6.5.6. Field Performance Test

After the equipment has been installed, the Contractor shall check the performance of the equipment in site field locations. All hardware shall be integrated with the field equipment and peripheral devices, all inputs and outputs interfaces installed & integrated with relevant software all test readings recorded in accordance with the FAT procedures. The field performance test shall exhibit generally all functions of the equipment and duplicate factory test. All FAT variances must be corrected prior to the start of the field performance test. The list of final tests to be carried out in the field shall be listed in the site-testing document by the contractor.

6.5.7. Field Installation Test

The contractor shall perform field installation test as per functional performance test mentioned earlier to confirm operation of basic functions such as data acquisition, user interface, and the support and utility functions. All hardware shall be tested by running

diagnostics. The exact content of the field installation test shall be determined jointly by the Contractor and employer.

All variances found during this field performance test shall be fixed/resolved by the Contractor to employer's satisfaction prior to the start of the availability test.

6.5.8. Availability Test

After field performance test, 3 months availability test shall be conducted on supplied systems under normal day-to-day operating conditions. The test shall verify the reliability and integrity of the database, web interfaces, consumer portal, report and all network and communication devices & interfaces and, under these conditions, verify system availability for 99.5%. Further each server and peripheral devices (operator console, storage devices etc) shall meet a minimum availability of 98% individually. In case of field devices (Smart Meters, DCU etc), applicable, downtime of individual Meters & DCUs can be excluded from system availability calculations, however, minimum 50% Meters shall be reporting for test to continue.

6.5.8.1. Test Responsibilities

Employer will be responsible for conducting the availability test. All functionalities of AMI/MDM/PLM shall be available during test. Employer will operate and maintain the system according to procedures described in the approved Contractor documentation. On call maintenance support shall be provided during this period. When on-site maintenance support is needed, qualified Contractor personnel shall arrive at the site within maximum four (4) hours of notification and shall keep employer fully informed of the progress in problem resolution. For availability purposes, this service response time and the associated on-site maintenance time shall be taken into account as defined in the section “Downtime” & Hold time” below. All spare parts used during the trail run for operational acceptance shall be provided by contractor.. Employer reserves the right to modify/update User interface displays, Consumer portal updating, and database changes/updating during this period to assess the impact of these changes on availability. Such changes shall be informed to contractor personnel 48 hours in advance before implementation.

6.5.8.2. Downtime

Downtime occurs whenever the criteria for successful operation defined in Section “Criteria for successful operation “are not satisfied. Downtime shall be measured from the start of diagnostic procedures until full service is restored. In the event of multiple failures, the total elapsed time for repair of all problems (regardless of the number of maintenance personnel available) shall be counted as downtime. For onsite response the delay in response time (more than four hours) shall be added to downtime.

6.5.8.3. Hold-Time

During the availability test, certain contingencies may occur that are beyond the control of either employer or the Contractor. These contingencies may prevent successful operation of the system, but are not necessarily valid for the purpose of measuring System availability. Such periods of unsuccessful operation may be declared "hold-time" by mutual agreement of employer and the Contractor. Specific instances of hold-time contingencies are:

1) Scheduled Shutdown: During scheduled shutdowns, or if an equipment failure occurs while its backup device is scheduled out-of-service, the resulting system outage shall be hold-time, provided that service can be restored according to Contractor-specified procedures within 30 minutes.
2) Power Interruption and Environmental Excursion: Loss of power or manual shutdown in the event of loss of environmental control shall be considered hold-time. If the system is operated during periods of power or environmental conditions beyond those specified, any resultant downtime shall also be considered hold-time.
3) Intermittent Failure: Periods during which an intermittent, recurring software or hardware failure is experienced will be considered hold-time, provided that the Contractor is engaged in remedial action and normal functions can be restored by Contractor-defined procedures whenever the failure occurs. Instead of accounting for the actual intermittent downtime, one hour of downtime shall be counted for each 120 hours of otherwise successful operation while the problem persists.
4) Failure of employer's Software: Time during which the system is down due to failure of software written and independently produced by employer shall be considered hold-time. If a failure in such software cannot be overcome by Contractor- defined procedures, execution of the failed program will be suspended. Programs developed by employer personnel under Contractor supervision are specifically excluded from this provision.
5) Service Response Time: A maximum four (4) hours of hold time will be allowed for the Contractor to respond to each call for maintenance support. The time between detection of a failure and the start of diagnostic procedures shall also be considered hold-time when performed by employer's personnel.
6) Corrected Design Defect: Hold-time may be declared by mutual agreement to ensure against similar future occurrences if a failure occurs due to a defect in system design for which the Contractor defines and implements corrective measures. In such a case, hold-time shall be allowed in increments of 120 hours to allow verification of the corrective action.

6.5.9. Test Duration and Criteria for Acceptance

After the elapse of 3 Months of cumulative test time, the availability shall be calculated considering the downtime recorded. Should availability falls short of specified percentage, the contractor may either (a) Continue the test by moving the starting time of the test forward and continuing the test until the consecutive hours have been accumulated and the specified

availability has been achieved subject to maximum of 75 days, Or (b) the contractor may restart the test for 3 months, however, more than two such restart shall not be allowed.

To establish that all failures have been satisfactorily repaired prior to the end of the availability test, no downtime, intermittent (hold time) failures, or more than one un-commanded fail over shall have occurred within 240 hours of the test's conclusion.

The successful completion of the availability test will lead to Operational Acceptance of the system.

6.6. Criteria for successful operation

The system shall be designed to meet the total system availability of 99.5%. That is, the ratio of total operational time minus downtime to total operational time shall be equal to or greater than 0.9995 Total operational time shall not include the hold time. The system shall be considered available as long as all functions defined in section 2 & 3 are available. Further each server and device meets a minimum availability of 98% individually.

6.7. Contractor's Maintenance Responsibility till Operational Acceptance

During this period, the Contractor shall make available resident Project Manager, hardware & software specialists, who shall be available upon notification by the Employer about any problem(s) that may exist. The contractor's specialists shall be required to respond to the Employer notification in line with the provisions of technical specifications. The contractor shall replace or repair all defective parts and shall have prime responsibility for keeping the system operational.

6.8. Type Testing

“Type Tests" shall be defined as those tests which are to be carried out to prove the design, process of manufacture and general conformity of the materials to this Specification. Previous reports may be accepted only for those items for which type testing requirements are not envisaged in this document. Type Testing shall comply with the following:

1) The Contractor shall submit copies of test reports and certificates for all of the Type Tests that are specified in the specifications and that have previously been performed (before contract award). These certificates may be accepted by the Employer only if they apply to materials and equipment that are essentially identical to those due to be delivered under the Contract and only if test procedures and parameter values are identical to those specified in this specifications carried out at accredited labs and witnessed by third party / customer’s representatives and not prior to three (3) years before the issue of tender.
2) Type Tests shall be performed for all equipment types for which certification is not provided as required in (a) above, or if it is determined by the Employer that the certification provided is not acceptable. If any of the type tests are required to be carried out, the same shall be carried out by the Contractor after informing to employer at its own expenses. The charges for carrying out that test(s) shall not be

payable by the Employer.

3) Type Tests shall be certified or performed by NABL accredited reputed laboratories using material and equipment data sheets and test procedures that have been approved by the Employer. The test procedures shall be formatted as in the specifications and shall include a complete list of the applicable reference standards and submitted for Employer approval at least four (4) weeks before commencement of test(s). The Contractor shall provide the Employer at least 15 days written notice of the planned commencement of each type test.
4) The Contractor shall provide a detailed schedule for performing all specified type tests. These tests shall be performed in the presence of a representative of the Employer.
5) The Contractor shall ensure that all type tests can be completed within the time schedule offered in his Technical Proposal.
6) In case of failure during any type test, the Contractor shall modify the equipment and shall repeat the type tests on that equipment at its own expenses. The type tests to be repeated shall be decided by the employer depending upon the severity of the failed test.

---------- End of this Section ----------

Section 7

Training Requirements

Section 7. Training Requirements

7.1. Description

This section describes the training requirements for employer personnel.

7.2. General

General requirement for training to be imparted is as follows:

1. Training shall be conducted by Contractor personnel who are experienced instructors and speak understandable English / Hindi.
2. All necessary training material shall be provided by the Contractor. Each trainee shall receive individual copies of documents used for training.
3. Class materials, including the documents provided to the trainees as well as class handouts, shall become the property of employer. Employer reserves the right to copy such materials, but for in-house use only.
4. For all training courses the travel and daily expenses inclusive of boarding, materials etc will be borne by the Contractor.
5. The Contractor shall quote training prices individually for each of the courses.
6. Course on each module must be done in one batch . Training modules shall not be clubbed.
7. The schedule, location, detailed contents, for each course shall be finalised during detail engineering. The number of participants in the training program may undergo change.
8. Employer will have the option to cancel any or all training courses. In the case of cancellation, the rate quoted against the respective course will not be paid to the Contractor.

The training courses, their duration, and the number of employer personnel to be trained in each course are identified in Appendix B.

7.3. Training Requirements for Smart Meter, DCU and associated communication system

Employer training course requirements on are described below in terms of the contents of each course to be provided.

7.3.1. Smart Meter Course

The training course on Smart Meter shall cover the following topics:

- Meter functionality and methodology to access it
- Measurement parameter and their use
- Installation and commissioning including Configuration of the meter parameters
- Communications settings required
- Testing and calibrating the meters
- Safety issues
- Associated Equipment (HHU)
- Trouble shooting common errors

7.3.2. DCU Course

The course should include following content:

- Mechanism of working algorithm
- Installation and commissioning
- DCU functionality and methodology to access it
- Communications settings required
- Operations available on the DCU
- Configuration of the DCU parameters
- Standard tests and procedures
- Alarm and event handling
- Trouble shooting common errors

7.4. Training Requirements for MDAS, MDM, Protocol and PLM Course

Employer training course requirements are described below in terms of the contents of each course to be provided.

7.4.1. MDAS Course

- Features
- Interoperability
- User management
- Supporting standards
- Configure meters and DCU
- Alarm and event handling
- On demand read
- Routine data pull

- Supporting technologies
- Supporting protocols
- Database management
- Reports
- Communication
- Settings required

7.4.2. MDM Course

- Overview
- Features
- Interoperability
- User management
- In corporation of new features
- Configure meters and DCU
- Application function
- Alarm and event handling
- On demand read
- Routine data pull
- Supporting technologies
- Supporting protocols
- Software base
- Database management
- Reports
- Communication
- Settings required
- Data analysis
- VEE
- Load control
- Demand response
- Demand side management
- Energy Accounting/Audit
- Data flow algorithm

7.4.3. Protocol course

Employer training course requirements on Protocol Course are described below in terms of the contents of the course to be provided.

- Capabilities and Benefits
- Recent developments
- Implementing protocol
- Standards in protocol
- Device modelling
- Protocol layers
- Protocol services
- Encoding protocol frames
- Application Association Request / Response
- Conformance testing
- Common problems
- Evaluation and comparison to other protocols
- Demonstrations
- Interoperability
- Applicability of AMI system
- Adaptability of the protocol
- Security of protocol

7.4.4. PLM Course

- Consumer Energy behavior pattern
- Demand Response
- Demand Side Management

7.5. Training Requirements for Computer System Hardware Course

The training course shall be designed to give employer personnel sufficient knowledge of the overall design and operation of the system so that they can correct the problems, configure the hardware, perform preventive maintenance, run diagnostic programs and communicate with contract maintenance personnel. The following aspects shall be covered:

- Configuration of the system hardware.
- Procedures for each element of the computer system, e.g., processors, auxiliary memories, LANs, routers firewall and printers.

- Network Configuration
- Preventive maintenance techniques and diagnostics
- Maintenance of the hardware
- Routine maintenance like cleaning of disk usage, purging of alarms, logs etc
- Hands-on Training

---------- End of this Section ----------

Section 8

Project Management and Implementation Plan

Section 8. Project Management and Implementation Plan

8.1. Project Management

The Contractor shall assign a project manager with the authority to make commitments and decisions that are binding on the Contractor. Employer will designate a Nodal officer to coordinate all Employer related activities. Consultant will also designate a project manager to coordinate all Consultant related activities. All communications between Employer/Consultant and the Contractor shall be coordinated through the nodal officer/ project manager. The project manager shall also be responsible for all communications between other members of the project staffs including sub contractor, if any.

8.2. Project Implementation Plan

The bidder shall submit a preliminary project implementation schedule along with the bid. The detail project implementation schedule shall be submitted by the Contractor after award for Employer's approval, which shall include at least the following activities:

1) Site Survey
2) Documents, Data Requirement Sheet, Drawing submission and approval
3) Type Testing Schedule
4) Hardware purchases, development/manufacturing and integration
5) Dispatch Schedule
6) Receipt, Storage, Installation & Field update schedule
7) Factory & Site Testing Schedule
8) Training schedule
9) Field trial run schedule

The project implementation schedule shall include the estimated period for completion and its linkage with other activities. The project implementation schedule shall also contain Employer activities as required by the Contractor to complete the project.

8.3. Progress Report

A progress report shall be prepared by the Contractor for each month against the activities listed in the project schedule. The report shall be made available to Employer & Consultant on a monthly basis, e.g., the 10th day of each month. The progress report shall include all the completed, ongoing and scheduled activities and transmittals issued and received for the month.

8.4. Transmittals

Every document, letter, progress report, change order, and any other written transmissions exchanged between the Contractor and Employer/Consultant shall be assigned a unique transmittal number. The Contractor shall maintain a correspondence index and assign transmittal numbers consecutively for all Contractor documents. Employer will maintain a similar correspondence numbering scheme identifying documents and correspondence that Employer initiates.

8.5. Review Meeting

Progress meetings shall be scheduled by the Employer and attended by the Contractor to review progress of the project. Progress meetings shall be used to review the progress, written correspondence exchanged since the last meeting, and open action items. The consultant shall also attend the meeting as and when required by the Employer.

The Contractor shall also attend technical meetings as and when required by Employer/consultant to discuss technical aspects of the project and to review Employer/consultant comments on documents. When appropriate, these technical meetings shall be conducted as extensions to the progress meetings.

8.6. Role of Consultant

Employer has appointed POWERGRID as consultant for rendering consultancy services for implementation of this Pilot Smart Grid project. No limitations shall be imposed on Employer's involvement of consultants in any activity related to the project. The consultants, at the discretion of the Employer’s project manager, shall participate in project activities and be accorded the same access to the Contractor's facilities as any member of Employer's project team. The involvement of the consultants may include, but shall not be limited to, progress and technical meetings, conference calls, document review, and system testing/validation.

Employer shall have the option of adding consultants to the transmittal distribution list to receive all correspondence initiated by the Contractor. Employer shall also have the option of adding consultants to the document distribution list to receive all or selected system documents. The consultants will be bound by the same confidentiality restrictions imposed on Employer personnel.

8.7. Document Review and Approval Rights

To ensure that the proposed systems conform to the specific provisions and general intent of the Specification, the Contractor shall submit documentation describing the systems to the Employer for review and approval.

The Employer will respond with written comments to the Contractor within thirty (30) calendar days after receipt of the documents. Documents requiring correction must be resubmitted by the Contractor to the Employer within fifteen (15) calendar days. The Employer will respond to resubmitted documents within fifteen (15) calendar days after

receipt of the document. No implementation schedule relief is to be implied for documents requiring correction and resubmission to the Employer.

The Employer shall have the right to require the Contractor to make any necessary documentation changes at no additional cost to the Employer to achieve conformance with the Specification.

Any purchasing, manufacturing, or programming implementation initiated prior to written, the Employer approval of the relevant documents or drawings shall be performed at the Contractor risk. Review and approval by the Employer shall not relieve the Contractor of its overall responsibilities to satisfy system functions and performance requirements in accordance with the Specification.

To help the Employer manage the review and approval of documents during any given period, the Contractor shall stagger the release of documents over the time allocated in the project schedule. The number and size of documents shall be factored into the document release schedule. At any time, no more than five (5) documents shall be submitted to the Employer for review and approval.

8.8. Project Schedule

8.8.1. Implementation Schedule

The implementation schedule for the Project shall be Eighteen months (18) from the date of award. **Appendix A** provides an implementation schedule guidelines consistent with the phased implementation plan described herein and the Implementation Schedule for the AMI & PLM system.

The Contractor shall produce and maintain the implementation schedule. The overall project plan shall consist of a Milestone Plan and a detailed Schedule Plan.

Within four (4) weeks of signing of contract, the Contractor shall submit detailed project schedule as described below. The project schedule shall include all activities to track overall direction and integration of the project from inception through completion.

The implementation schedule shall include the project milestones, the Contractor activities and the Employer activities. The project schedule shall be an accurate representation of the progress and planned activities of the project.

The actual progress made to date and the scheduled delivery date for the completed systems shall be closely monitored by both the Contractor and the Employer. The following information shall be reported to the Employer in a clear and concise manner using the tabular and graphic capabilities of the project management software:

1) An overview and general assessment of all the Employer and Contractor activities and any progress or delays in these activities since the last reporting period
2) Identification of tasks in the critical path together with an analysis indicating any required remedial action
3) The amount of contingency time (float) remaining in the schedule

4) Information on each task, including:
   a) Estimated start and finish dates
   b) Any change in the estimated dates since the last reporting period
   c) Estimated total number of calendar-days to complete the task
   d) Per cent of task completed
   e) An indication of whether the start date was manually entered or computed.

5) Total project resources

6) The tasks to begin in the next two reporting periods

7) The tasks to be completed in the next two reporting periods

8) The tasks completed in the last two reporting periods

The content and format of the project schedule shall be subject to the Employer approval. The Contractor shall update and submit the project schedule to the Employer at least two days prior to each progress review meeting.

8.8.2. Contractor Activities

The implementation schedule shall be compiled by the Contractor summarizing all activities, and shall include but not be limited to the following:

1) Survey, Design & Engineering

2) Hardware purchases, development, and integration

3) Hardware production schedules

4) Documentation preparation and release

5) Documentation revision and release following the Employer review

6) Software design, coding, unit testing, and integration

7) System integration

8) Type Tests and Factory testing

9) Shipment

10) Receipt, forwarding and staging

11) Installation & Commissioning

12) Site Acceptance testing

13) Field Trial runs

Each scheduled task shall have an estimated duration for completion and predefined relationships with other tasks. Relationships shall be used to enforce the logical progression of work in as much as certain tasks cannot start until others have been completed.

8.8.3. The Employer Activities

The implementation schedule shall contain all the Employer activities required in order for the Contractor to complete their systems and integration tasks, including the following:

1) Document reviews and approvals
2) Participation in all levels of testing and training
3) Any site preparations, if required.
4) Assistance in database, display and report definition
5) Participation in Installation & Commissioning

8.8.4. Documentation Schedule

The documentation schedule shall include an entry for each document and drawing to be delivered throughout the project. Each documentation schedule entry shall include the document or drawing title, number, revision level, actual or future submittal date for the Employer review or approval, date of completion of review or approval by the Employer, and outcome of review or approval by the Employer. When the Employer requires correction to any document, the documentation schedule shall be updated with a new entry for the next revision of the document. The content and format of the documentation schedule shall be subject to the Employer approval.

8.8.5. Training Schedule

The training schedule shall identify the dates & duration of all of the training courses. The Contractor shall work with the Employer to determine the training schedule. The training schedule shall be subject to the Employer approval.

8.8.6. Project Progress Reporting

With the intent to assure quality management and project progress as per the implementation schedule, progress reports submitted for each reporting period and Progress Review Meetings shall focus on the following:

8.8.6.1. Monthly Progress Reports

A Monthly Progress Report shall be prepared by the Contractor that includes inputs from all its subsystem. The report shall be made available to the Employer as hard copy and soft copy, by the 10th working day of each month and shall include but not be limited to:

1) Updated project schedule highlighting any deviations from the previous issue of the project schedule
2) Explanation and anticipated effect of each schedule deviation and its implication to the Employer.

3) Schedule recovery plan for any deviation incurring a delay in delivery date. (All delays shall be factored into the project schedule as soon as they are known to the Contractor.)
4) A summary of activities performed by the Contractor and the Employer during the previous reporting period
5) An updated list of all correspondence transmitted and received by the Contractor
6) Updated documentation schedule
7) Updated training schedule
8) Updated list of Contractor and the Employer action items with status, description of required information, and required resolution dates
9) Summary of pending and upcoming Contractor and the Employer activities during the next two reporting periods along with required completion dates
10) Status of unresolved contract questions and change requests
11) Log of invoice status
12) Description of current and anticipated project problems and steps to be taken to resolve each problem.

8.9. Implementation Plan

The Bidders shall propose preliminary implementation plans. The Employer and the Contractor shall finalise the detailed implementation plan following the award of the contract.

8.9.1. Implementation Steps

The basic implementation steps pertaining to the project are:

1) Design & parameterize the integrated AMI & PLM system/Hardware.
2) Conduct site surveys, identify equipment locations and required site preparations.
3) Subsystems layouts, design, manufacture, factory & type test (if applicable).
4) Shipping, installation and field testing of above.
5) Design, manufacture, factory and type test (if applicable) of equipment / Hardware.
6) Shipping, installation and field testing of above.
7) Field testing of the AMI & PLM system.
8) Acceptance test and Field trial run of AMI & PLM system.

Though not detailed, the above steps are intended to encompass all relevant work required to provide the Employer a fully working AMI & PLM system supporting all Project commitments.

----------End of this Section----------

Section 9

Documentation and Deliverables

Section 9. Documentation and Deliverables

9.1. General

To ensure that the proposed systems conform to the specific provisions and general intent of the Specification, the Contractor shall submit documentation describing the systems to Employer for review and approval. Contractor shall also submit the drawings / documents for all the hardware & software required for site installation, testing and commissioning and thereafter operation of the system. The Contractor shall obtain approval of Employer for the relevant document at each stage before proceeding for purchase, manufacturing, system deployment, factory testing, erection, site testing, training etc.

9.2. Instructions

Documents shall have unique identification number along with revision number. The Contractor shall submit three (3) hard copies of each document/drawing for Employer's review and approval along with soft copy with each submission. One copy of all technical documents shall be submitted to Consultant directly. After approval one (1) set of all the documents shall be submitted as final documentation. Any changes observed during field implementation shall be incorporated in the as-built drawing and two copies of same shall be submitted to Employer on electronic media in pdf format.

The Contractor shall also submit two (2) sets of Technical User manuals/guides/O&M manuals/manufacturer's catalogues for all the hardware & software supplied under the contract. The user manual shall at minimum include the principle of operation, block diagrams, troubleshooting and diagnostic and maintenance procedures. Considering all the components of the system, the following documents/drawings shall be required under the system.

9.3. Hardware Documentation Requirements

The following document shall be submitted as applicable for the subsystem.

1) System Description Documents (Overview)
2) Data Requirement sheets for all items
3) Data base Documents
4) Drawings/Documents for manufacturing/Assembly of the equipment/system
5) Drawings/Documents for installation of the equipment/system at site
6) Software description/design documents for each module
7) Factory Test procedure and report
8) Manuals for each equipment
9) System Configuration Parameter
10) Site Testing procedure and reports
11) Training documents

12) Software Licenses
13) Type test procedure and reports
14) Inventory of the hardware
15) Panel General and Internal Arrangement drawing indicating modules, components location etc.
16) Installation drawing
17) Schematic drawing

9.4. Software Documentation Requirements

The documents to be submitted shall include the following information:

9.4.1. Software Inventory

An inventory of all software shall be maintained by the Contractor. The Contractor shall submit the following inventory lists: the preliminary inventory list at the time of the Functional Description document approval, an updated inventory list immediately prior to the start of the FAT, and the final inventory list at the time of system commissioning. The inventory shall include the name of each program, a cross reference to pertinent Contractor documents, language and libraries used, and an indication of whether the program is to be standard, modified, or custom.

9.4.2. Functional Description

Functional description documentation shall be provided for each function described in this specification. It shall include the following information for each function:

1) Introduction describing the purpose of the function with references to other documentation to aid the reader's understanding of the functions performed.
2) Performance requirements that describe the execution periodicity and the tuning parameters that control or limit the capabilities of the software.
3) Complete description of the operation, data and logic interfaces with other functions.
4) Sample displays where applicable.

9.4.3. Software Design

Software design documentation shall be provided for each function before the Factory Acceptance Test. It shall include detailed descriptions of the following items:

1) The overall organization and architecture of the software logic such as a breakout of the software into software modules.
2) Mathematical algorithms and formulae.
3) Complete description of the algorithms, operation and the data and logic interfaces with other functions.

4) Data dictionary in which the following (as applicable) information for each data item in tables, file, and array is provided: (1) Name (2) Purpose, (3) Location, (4) Length of data item, and (5) Initialization.
5) Databases internal and external to the software, along with a description of all inputs required and the output produced by the software modules.
6) Interfaces with other software modules.
7) Design limitations such as field length and the maximum quantity of data items that can be processed.

9.4.4. Database Documentation

Database documentation shall describe the structure of the database. The documentation shall define the individual elements (files, records, fields, and tables) and their interrelationships. Portions of the database developed specifically for Owner's systems shall be identified.

Documentation shall also be provided that instructs the user in the preparation of data to be used for the databases, including:

- The overall organization of input records
- The format of each data record
- Each data field and the valid entries pertaining to the fields.

Sufficient database documentation shall be provided to enable the database to be updated or regenerated when inputs are changed and added, programs are modified, and new programs are added.

9.4.5. User Documentation

User documentation shall contain detailed operating instructions and procedures. Instructions and procedures shall be explained step-by-step with an explanation of how each step is performed, which parameters can be adjusted, and the effects obtained by varying each parameter. Additionally, the user documentation shall describe:

1) All user guidance and error messages, along with the steps necessary to recover from errors
2) The user interface including displays and keyboard operations used to control, review the input and output produced by the function. All displays relevant to the function shall be included along with a description of each dynamic display field.
3) Alarms and messages issued by the function and the conditions under which they are generated
4) Procedures to be followed for computer system restarts, failures, and failovers.

9.4.6. System Administration Documentation

System administration documentation shall be provided to guide employer personnel in the operation and procedures required to generate and update the systems, including system

software, database, application software, and other elements of the systems. System administration documents shall be provided for the following items:

1) Network communications management
2) Processor configuration
3) System performance monitoring
4) System restart/failover management and diagnostic procedures
5) System generation and management
6) Database generation and management
7) Display generation and management
8) Report generation and management
9) Diagnostic programs
10) Software utilities
11) Software maintenance
12) Application software parameters and tuning guides
13) Web Administration
14) Other Contractor supplied system software not included above.

9.5. Test Documentation

Documentation for all factory, field, and availability tests shall be provided.

9.6. Training Documentation

Training documentation shall be provided for all courses in accordance with the requirements.

---------- End of this Section ----------

Section 10

Maintenance and Support Services

Section 10. Maintenance and Support Services

10.1. General

The scope of work under maintenance & support services shall include a comprehensive maintenance of all the software and hardware along with field devices such as Smart Meters, DCU etc. provided by the contractor under this project .The contractor shall also provide future integration and support services for meeting the future expansion requirement envisaged under this project. The maintenance practices to be followed shall be as per ISO 20000 Standard. The essence of the maintenance and support services is to provide maintenance support for the designated hardware, software and field devices, with the goal of meeting the availability as set forth herein**.**The operation of the system for one year after the operational acceptance of the project will be in the scope of contractor.

10.2. Maintenance Support

The period of maintenance shall commence immediately after the operational acceptance of the system. Duration of maintenance shall be five (5) years from the date of operational acceptance of system, as a whole. The Employer may extend the duration of maintenance period for up to 2 years at the same terms and conditions. The Contractor shall also operate the system during the first year of maintenance.

The nature of maintenance support required for the different type of systems and components are described in the Table 10.1 below:

Table 10.1 Maintenance support and Availability requirements

Sl.no.	System	System Availability Requirements
1	Complete System availability including (field devices, software applications, Servers, Storage System, Network Equipment, & Cyber security system etc.)	99.5%

The availability of individual devices shall be maintained separately and shall be at least 98%.

For all third party equipment (Hardware & Software) Contractor shall have back to back support along with supply of spare with appropriate response time from OEM/OEM Authorised representatives. Contractor shall be responsible for coordination with the OEM for all matter related to that equipment. The Contractor shall guarantee the overall response times and availability requirements specified in this technical specification.

The maintenance of the System shall be comprehensive and shall comprise of the following category of works which is further elaborated for each of the different subsystems:

Preventive Maintenance Activity (performance monitoring, system backup, hardware & software maintenance and update, field & network devices firmware update, emergency response and troubleshooting etc.)

10.3. Integration of new devices (Meters, DCU, networking devices, integration with existing system etc.).The contractor shall maintain spares in order to achieve the availability criteria defined in this document Preventative Maintenance Activity

The preventive maintenance activities shall be performed by the Contractor to keep the system running at optimum level by diagnosis and rectification of all hardware and software failures and would broadly include:

1) Repair / replacement of defective equipment. The Contractor shall be responsible for repair/replacement of all the hardware including consumables required for the various systems. Only replacement of printer cartridge and paper rim shall be excluded from the scope of the Contractor.
2) Configuration of the replaced hardware and software, periodic routine checking as part of a preventive maintenance program (as described in further detail in this document) which would include checking of functionality of hardware and software,
3) Monitoring of the performance of the system and doing necessary tuning for optimum performance to accommodate any changes such as addition of new components.
4) Providing all necessary assistance to Employer for addition and modification of database and user interface & consumer portal displays and Database sizing activities.
5) Take Backup of the system at regular interval
6) Restoration of the systems upon its failure and to restore the functioning of the various systems at the different Control Centres.
7) Routine works like database works, and other such day-to-day operational activity would primarily be the responsibility of employer and in case of any difficulty in this regard the same shall be referred to the contractor for support.

10.3.1. Hours of Cover

The Contractor shall provide at least one engineer who has an experience and skill to maintain the system to the desired level of availability. The contractor's on-site support for Control Centre shall be on all days from 9:00 am to 5:30 pm local time (IST), excluding public and Employer Company holidays, throughout a year. At least one Engineer having expertise in relevant field shall be available on all days at each Control Centre. The timings for Emergency Support would be 24 hours a day, 7 days a week throughout the year.

The support personnel so deployed shall be qualified personnel having at least one year of experience in the relevant field. The contractor shall submit the CV's and recommendation letter from customer's for all support personnel(s) to Employer for approval before

deployment at site. The Employer can ask the Contractor to replace the personnel deployed for maintenance support if his performance is not found to be satisfactory.

10.3.2. Service Response requirements

The severity levels are defined in coming sections and the requirement of response time for various severity levels is defined below:

- Severity Emergency Support for Severity 1 issues are to be provided 24 hours a day, seven days a week. The on-call support team shall include all key technical competencies so that any aspect of a system failure can be attended. Severity 1 problems shall be reported by telephone for rapid response; target response times are defined in this section below for severity 1 problems, the key objective is to restore the system to an operational state as quickly as possible, including by a temporary workaround. Resolution of the defect may be completed during standard hours.
- Severity 2, 3, and 4 problems shall be reported by Employer through a call tracking system to be provided by the contractor. Resolution of problems may also be provided by an individual fix that will be installed by the contractor at no extra cost to Owner.

10.4. Monitoring

The operation and performance of the various systems under AMC shall be monitored on a fortnightly basis, the contractor shall review the following, analyse the results, and submit report to Employer. The contractor shall conduct at least the following monitoring at control centre:

10.4.1. Log Monitoring

- System logs for a selected day
- System history log
- Aggregate data collection
- Field & Network Device failure
- Events Collection
- Availability of communication link

During monitoring if any defect/ abnormality are found, the contractor shall undertake corrective maintenance for the same. All coordination for failure & poor performance of ISP & GPRS service provider shall be the responsibility of contractor during AMC period.

10.4.2. Resource Monitoring

Resource Monitoring services comprises checking the system's major node resources, gather log data, analyse results, and advise Employer on the appropriate actions to be taken and undertake any agreed upon actions. The NMS system shall be able to continuously collect the following information:

- CPU loading (Peak and Average)
- Memory utilisation (Peak and Average)
- Disk utilization (Peak and Average)
- LAN utilization (Peak and Average)
- Operating system resource utilisation reports
- System error log

The bidder shall submit the procedures details to meet the above along with the offer

10.4.3. Cyber Security System Monitoring

The Contractor shall also be responsible for monitoring of the cyber security system. The logs of the system shall be analysed for exceptions and the possible incident of intrusion/trespass shall be informed to the Employer. The monitoring shall encompass the various cyber security devices installed at Control Centre and Substations such as firewalls, Intrusion prevention system (both network based and host based), routers etc. The Centralised Monitoring Console (CMC) shall monitor and continuously collect the above logs.

The Cyber security system shall also be subjected to Annual Security Audit from CERT-In listed auditors at the cost of the Contractor during maintenance period. Contractor shall implement the recommendations/remedial actions suggested by the Auditor after audit.

10.5. Patch Management

The contractor shall also be responsible for providing updates/patches for the software products supplied under the project. All other patches of third party product like Operating System and Anti-virus shall be tested by the Contractor prior to installing in the Employers network. Other products like Firewalls shall also be provided with secure patch management. A secure patch management and deployment system is to be established which shall be provided with single point of Internet connectivity. All the patches shall be downloaded through this single point of connection. Internet connection shall be provided. The Contractor shall provide a mechanism for patch management so that it is known that what patches have been applied, what all patches are pending but available with us and what is the recent release of patches for the various products Any patch shall be applied only with express permission of the employer's representative

10.6. Physical maintenance

The contractor shall undertake physical maintenance of all equipment/modules under the scope of this contract, in accordance with this section once in 3 months. The physical maintenance shall include cleaning, dusting, inspection of equipment for loose connections, damage to insulation, pest infections etc.

Equipment shutdown during preventive maintenance shall be deemed as available.

10.7. Integration of New Equipment

All future services, protocol emulations and configuration support for integration of Meters, DCUs, Network Devices, Web services, integration with other offline applications etc shall be the responsibility of contractor and shall be part of the maintenance charges**.**

10.8. Problem/Defect Reporting

The bidder shall submit an appropriate problem/defect reporting procedure to meet the requirement of all severity levels to get the approval of the same from Employer.

The problems will be categorized as follows in table 10.2:

Table 10.2: Severity Levels

Category	Definition
Severity 1 – Urgent	Complete system failure, severe system instability, loss or failure of any major subsystem or system component such as to cause a significant adverse impact to system availability, performance, or operational capability (as described at 10.6.1-Severity-1)
Severity 2 – Serious	Degradation of services or critical functions such as to negatively impact system operation. Failure of any redundant system component such that the normal redundancy is lost (as described at 10.6.1-Severity-2) Non-availability of Man-power at Control Centre during working hours, non-availability of spares
Severity 3 – Minor	Any other system defect, failure, or unexpected operation (as described at 10.6.1-Serverity-3)
Severity 4 – General/Technical Help	Request for information, technical configuration assistance, “how to” guidance, and enhancement requests. (As described at 10.6.1-Severity-4)

10.9. Severity levels

The detail of the systems under different severity levels is as below**:**

10.9.1. Severity-1(Urgent Support**)**

Support is required when there is a complete system failure, severe system instability, the loss/ failure of any major sub-system / system or its components, which may significantly impact the system availability, performance, or operational capability at Control centre. Following outages/disruptions will be considered under Serverity-1:

1) Loss of data due to any problem in software /Hardware.
2) Outages of any application software.

3) Cyber Security issues.

4) Outage of both Routers and LAN Switches.

5) Loss of data exchange with other computer systems of utility.

The failure of field devices shall be considered as Severity-1 level, however a maximum time of Organization and travelling time of 24 hrs shall be provided to rectify field defects.

Upon receiving intimation, the representative of the contractor would immediately attend to the problem and restore all functionalities at the earliest**.**

10.9.2. Severity-2

The support services not defined under Severity-1 are included under this category. Coverage under this severity would be outages that do not immediately cause on line data loss but subsequently could result into Severity-1 category outage, loss of an important subsystem that may affect the day-to-day works and loss of archived data.

- Failure of Storage System, stoppage of data collections for archiving and outage of other applications not covered under severity-1 are included in this category.
- Failure of any redundant system component affecting the critical redundancy like loss of any one Application Processor, Router would also be included in this category.
- Non-availability of designated contractor's Man-power at control centre as well as required inventory of spares specified here.

10.9.3. Severity-3(standard support)

The support services included under this category are when the outage or loss of functionality is neither of an emergency nor priority functionalities as indicated in severity level 1 or 2 above. Problems like database reworking, failure of any one workstation, printers etc. would be covered under this category.

10.9.4. Severity-4(General Technical Help)

Request for information, technical configuration assistance, "how to" guidance, and enhancement requests are included under this category**.**

10.10. Response & Resolution Time

This section describes the target times within which the contractor should respond to support requests for each category of severity. The Initial Response Time is defined as the period from the initial receipt of the support request (through approved communications channels) and the acknowledgment of the contractor subject to the Maximum time defined in Table 10.3. The Action Resolution Time is the period from the acknowledgement of support request to the contractor delivering a solution subject to the Maximum time defined in Table 10.3 This period includes investigation time and consideration of alternative courses of action to remedy the situation. The Action is defined as a direct solution or a workaround**.**

Except for Severity Level 1 all response/resolution times (hours and days) specified in table 10.3 are working hours only.

Table 10.3 Emergency Support Response/Resolution Time

Severity	Initial Response Time(Working Hours)	Initial Response Time(Non-Working Hrs)	Action Resolution Time	Action
1	5minutes	30 minutes	2 hours	An urgent or emergency situation requiring continuous attention from necessary support staff until system operation is restored – may be by workaround.
2	5 minutes	2 Hours	12 Hours	Attempt to find a solution acceptable to Employer (dependent on reproducibility), as quickly as practical.
3	2 hours	1 day	2 days	Evaluation and action plan. Resolution time is dependent on reproducibility, ability to gather data, and Owner/ Employer's prioritization. Resolution may be by workaround.
4	2 hours	1 day	5 days	Report on the problem/query is to be furnished.

10.11. Availability and Maintenance Charges Payment Calculation

The contractor shall provide guaranteed availability for various types of Systems as specified in Table 10.1.

The non-availability hours for availability calculation shall be counted from the end of the allowed Action Resolution time. A standardized register shall be maintained at site containing full details of each outages, actions taken by Employer to correct the problem, applicable Severity level, time of reporting to the contractor support engineer/support, allowed Response time as per the Response times defined in above section, actual Resolution time, and signature of Engineer-in-charge as well as the contractor's support engineer of the site.

In the event of multiple failures at a site, due to a common cause, the first FPR (Field Problem, Report) logged shall be used for the purpose of availability calculation. However, simultaneous multiple outages due to unrelated cause would be counted separately.

10.11.1. Availability computation for the system

Availability computation shall be done on per quarter yearly basis per site. The formula to be used for availability computation shall be as under:

Availability per quarter yearly (per site) = $\frac{THQ- (S1 \times 1+S2 \times 0.8+S3 \times 0.5)}{THQ} \times 100\%$

Where:

THQ is total hours in the quarter

S1 is the total non-available hours in Severity Level-1

S2 is the total non-available hours in Severity Level-2

S3 is the total non-available hours in Severity Level -3

10.11.2. Payment of maintenance charges (based on System availability)

In the event of availability below a certain level, the maintenance charges would be proportionately reduced as follows:

For Software System:

Availability at Control Centre per quarter	**Deduction as % of the apportioned price of total AMC(software portion) for the central system (quarterly price)**
> 99.5%	NIL
Less than 99.5%	Deduction of 2% of the apportioned quarterly AMC charges for every 0.5% or part there of decrease in availability under 99.5%.

FOR HARDWARE SYSTEM:

Availability at Control Centre per quarter	**Deduction as % of the apportioned price of total AMC(Hardware portion) for the central system (quarterly price)**
> 98%	NIL
Less than 98%	Deduction of 2% of the apportioned quarterly AMC charges for every 0.5% or part there of decrease in availability under 98%.

The computation of Availability / Non-availability would be rounded up to 2 decimal and any deduction in the maintenance charges thereof would be calculated on pro-rata basis.

10.12. Contractor's Obligations and Responsibility

The contractor shall guarantee continuous availability of the system as indicated in section 10.8 In order to optimise and improve the response of the system, the contractor may re-

install the program modules after making the Employer engineer aware of the consequence (like data loss, database rebuild etc.).

Any modification of software/Operating System required to restore functionality due to hardware upgrades/replacement, patches, or arising out of a necessity to fix FPRs (Field problem reports), would be done by the contractor at no extra cost to Employer.

The contractor will submit FSR (Field Service Report) and the steps taken to solve the problem, along with details of code changes.

10.13. Responsibilities of Employer

The responsibilities of the Employer during the maintenance period are as follows:

1) Employer shall ensure that proper Environmental conditions are maintained for the system.

2) Employer shall ensure that the System is kept and operated in a proper and prudent manner as described in the system documentation provided by the Contractor and only trained Employer representatives (or persons under their supervision) are allowed to operate the system.

3) Employer shall provide access to the sites of installation for purposes of providing Support Services.

4) Employer shall provide the contractor with Space for Office and storage for their maintenance staff and spares.

10.14. Responsibility Matrix

The table 10.4 provides a summary definition of the roles and responsibilities of the contractor and Employer.

Legend: ● This indicates who has primary responsibility to perform this function.

A This indicates who will provide assistance.

TABLE 10.4 : RESPONSIBILITY MATRIX

Item	Task	Employer	Contractor
0.0	PROBLEM IDENTIFICATION		
0.1	Root cause analysis to determine whether the fault is attributable to Hardware or Software.	----	●
0.2	Resolution of problems involving third party maintainer where there is uncertainty whether the root cause is hardware or software.	----	●
1.0	SOFTWARE PROBLEM RESOLUTION		

1.1	Report problem and assist with problem identification	----	●
1.2	Provide or recommend corrections, temporary patches, workarounds or other fixes to system problems	----	●
1.3	Install and test corrections, temporary patches, workarounds or other fixes to system problems	----	●
2.0	ROUTINE SOFTWARE SUPPORT		
2.1	Build and maintain database, displays and reports	----	●
2.2	Perform system back-ups	----	●
2.3	Restore or reinstall software from back-ups	----	●
2.4	Monitor system logs (part of remote monitoring service)	----	●
2.5	Maintain system logs	----	●
2.6	Maintain user accounts	●	A
3.0	HARDWARE PROBLEM RESOLUTION		
3.1	Report problem and assist with defining problem	●	A
3.2	Troubleshoot problem to diagnose if it is software-related or hardware-related	----	●
3.3	Identify failed component, Replace failed components in the system using parts from spares inventory	----	●
3.4	Restore operation of repaired/replaced equipment	----	●
4.0	HARDWARE SPARE PARTS		
4.1	Manage local spares inventory	----	●
4.2	Replenish local spares inventory	----	●
5.0	INTEGRATION AND DATABASE WORK AT CONTROL CENTRE END		
5.1	Field Device Integration	----	●
5.2	Other System Integration	----	●
6.0	CYBER SECURITY MONITORING		

6.1	Patch Updates	----	●
6.2	Cyber Security Monitoring	●	A
6.3	Annual Audits	----	●
6.4	Implementation of Recommendations during Audit	----	●
6.5		●	---

---------- ---------- End of this Section ----------

APPENDIX-A

GENERAL INFORMATION

Appendix - A General Information

TABLE A-1: IMPLEMENTATION SCHEDULE

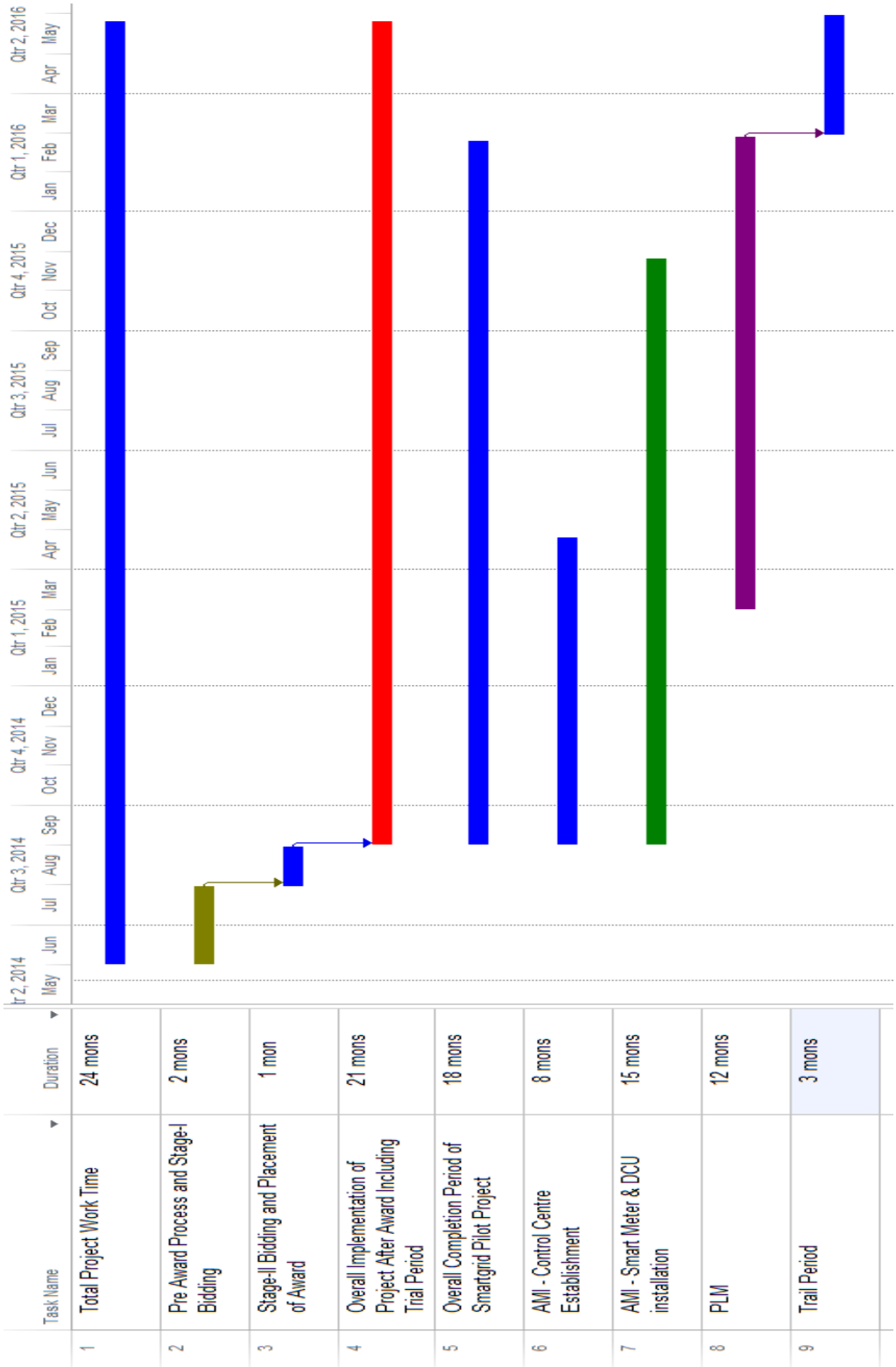


FIGURE A-1: SINGLE LINE DIAGRAM OF SILIGURI TOWN

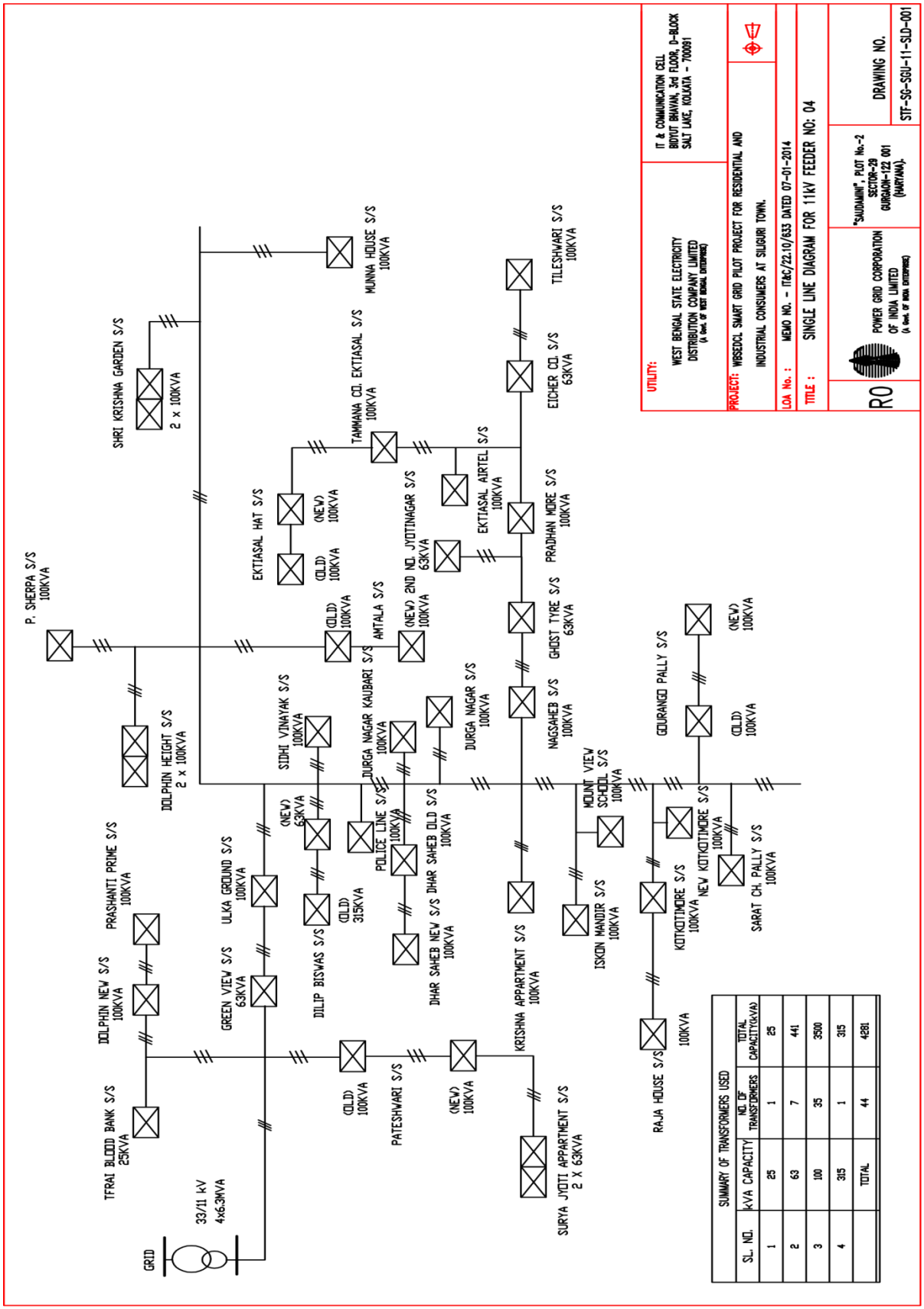

UTILITY:
WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED (A Govt. OF WEST BENGAL ENTERPRISE)
IT & COMMUNICATION CELL
BIDYUT BHAVAN, 3rd FLOOR, D-BLOCK
SALT LAKE, KOLKATA - 700091
PROJECT: WBSEDCL SMART GRID PILOT PROJECT FOR RESIDENTIAL AND INDUSTRIAL CONSUMERS AT SILIGURI TOWN.
LOA No. : MEMO NO. - ITAC/22.10/633 DATED 07-01-2014
TITLE : SINGLE LINE DIAGRAM FOR 11kV FEEDER NO: 04
POWER GRID CORPORATION OF INDIA LIMITED (A Govt. OF INDIA ENTERPRISE)
"SAUDAMINI", PLOT No.-2 SECTOR-29 GURGAON-122 001 (HARYANA).
DRAWING NO.
STF-SG-SGU-11-SLD-001
R0
GRID
33/11 kV 4x6.3MVA
TFRAI BLOOD BANK S/S 25KVA
DOLPHIN NEW S/S 100KVA
PRASHANTI PRIME S/S 100KVA
GREEN VIEW S/S 63KVA
ULKA GROUND S/S 100KVA
DILIP BISWAS S/S (OLD) 315KVA
(NEW) 63KVA
SIDHI VINAYAK S/S 100KVA
DOLPHIN HEIGHT S/S 2 x 100KVA
P. SHERPA S/S 100KVA
SHRI KRISHNA GARDEN S/S 2 x 100KVA
(OLD) 100KVA
PATESHWARI S/S
(NEW) 100KVA
DHAR SAHEB NEW S/S
DHAR SAHEB OLD S/S 100KVA
POLICE LINE S/S 100KVA
DURGA NAGAR KAUBARI S/S 100KVA
AMTALA S/S
(OLD) 100KVA
(NEW) 100KVA
DURGA NAGAR S/S 100KVA
KRISHNA APPARTMENT S/S 100KVA
SURYA JYOTI APPARTMENT S/S 2 X 63KVA
EKTIASAL HAT S/S
(NEW) 100KVA
(OLD) 100KVA
TAMMANA CO. EKTIASAL S/S 100KVA
2ND NO. JYOTINAGAR S/S 63KVA
EKTIASAL AIRTEL S/S 100KVA
MUNNA HOUSE S/S 100KVA
EICHER CO. S/S 63KVA
TILESHWARI S/S 100KVA
PRADHAN MORE S/S 100KVA
GHOST TYRE S/S 63KVA
NAGSAHEB S/S 100KVA
MOUNT VIEW SCHOOL S/S 100KVA
ISKON MANDIR S/S 100KVA
GOURANGO PALLY S/S
(NEW) 100KVA
(OLD) 100KVA
KOTKOTIMORE S/S 100KVA
NEW KOTKOTIMORE S/S 100KVA
SARAT CH. PALLY S/S 100KVA
RAJA HOUSE S/S 100KVA
SUMMARY OF TRANSFORMERS USED
SL. NO. | kVA CAPACITY | NO. OF TRANSFORMERS | TOTAL CAPACITY(kVA)
1 | 25 | 1 | 25
2 | 63 | 7 | 441
3 | 100 | 35 | 3500
4 | 315 | 1 | 315
TOTAL | | 44 | 4281

TABLE A-2: LIST OF FEEDERS IN PROJECT AREA

Siliguri Town Smart Grid Pilot Project

11 kV/400 V Transformers

Sl. No	S/S Name	KVA capacity of Transformer	No. of Transformer
1	TFRAI Blood Bank	25	1
2	Dolphin New	100	1
3	Prashanti Prime	100	1
4	Green View	63	1
5	Ulka Ground	100	1
6	Pateshwari old	100	1
7	Pateshwari New	100	1
8	Surya Jyoti Apartment	63	2
9	P. sherpa	100	1
10	Dolphin Height	100	2
11	Dilip Biswas old	315	1
12	Dilip Biswas New	63	1
13	Sidhi Vinayak	100	1
14	Police line	100	1
15	Durga Nagar Kaubari	100	1
16	Dhar Saheb New	100	1
17	Dhar Saheb old	100	1
18	Durga Nagar	100	1
19	Krishna Apartment	100	1
20	Nagsaheb	100	1
21	Ghost Tyre	63	1
22	Iskon Mandir	100	1
23	Mount View School	100	1
24	Raja House	100	1
25	Kotkotimore	100	1
26	New Kotkotimore	100	1
27	Sarat Ch. Pally	100	1
28	Gourango Pally old	100	1
29	Gourango Pally New	100	1
30	Shri Krishna Garden	100	2
31	Munna House	100	1
32	Tileshwari	100	1

33	Eicher Co.	63	1
34	Pradhan More	100	1
35	Ektiasal airtel	100	1
36	2nd No. Jyotinagar	63	1
37	Tammana Co. Ektiasal	100	1
38	Ektiasal Hat New	100	1
39	Ektiasal Hat Old	100	1
40	Amatala old	100	1
41	Amatala New	100	1
			44

33/11 kV Transformers

Sl. No	S/S Name	MVA Capacity Of Transformer	No. of Trnsformers
1	SLG	6.3	4

Feeder 4 DTs Summary

Sl. No	kVA Capacity	No. Of Transformers	Total Capacity(kVA)
1	25	1	25
2	63	7	441
3	100	35	3500
4	315	1	315
		44	**4281**

---------- ---------- End of this Appendix ----------

APPENDIX-B

BILL OF QUANTITY (BOQ)

Appendix - B Bill of Quantity

TABLE B-1: CONTROL CENTRE ITEMS

Sl. No	Description	Unit	Quantity
1	**Application Software***	**Nos.**	
(i)	Meter Data Acquisition software(MDAS)	Lot	1
(ii)	Meter Data Management software (MDM)	Lot	1
(iii)	Peak Load Management software(PLM)	Lot	1
(iv)	Web Application Server	Lot	1
(v)	Consumer portal	Lot	1
(vi)	SMS Gateway	Lot	1
2	**Data Archiving Software***		
(i)	Data archiving and SAN management Software	Lot	1
3	**Network Management Software***		
(i)	Centralized network management software along with patch management & Identity management	Lot	1
(ii)	Antivirus software for all machines in control centre	Lot	1
4	**Hardware for application**		
(i)	Application Server suitable for MDAS, MDM, PLM along with operating system*.	Set#	2
(ii)	GPS based time facility along with digital display for time and frequency.	Set	1
(iii)	Web Server & consumer portal for access	Set	2
5	**Hardware for storage**		

(i)	SAN based storage for storing 43000 nos smart meter data for 2 Years with 100% expansion capacity	No	1
(ii)	Data archiving Server	Nos.	2
6	**Hardware for network Management**		
(i)	Network Management server with patch & identity management	set	1
(ii)	Centralized management console with single monitor	Set	1
7	**Workstation Consoles**		
(i)	Workstation Consoles with dual 24" monitor along with Operating System and license	Nos.	2
8	**Network Hardware**		
(i)	Firewall with Network-based intrusion prevention system (NIPS) Minimum 8 Ethernet ports (1Gbps) and 4 Fiber Optic Ports	Nos.	2
(ii)	Router with Minimum 8 Ethernet ports (1Gbps) and 4 Fiber Optic Ports	Nos.	2
(iii)	LAN Switch (24 port 1000 / 100 / 10 Mbps , Layer 3 switching, 8 Ethernet ports (1Gbps))	Nos.	2
9	**Printers**		
(i)	Color laser printer	No	1
(ii)	Black and White laser printer Multifunction devices	No	1
10	**Furniture**		
(i)	Table for Workstation	Nos	3

(ii)	Table for Printers	Nos	2
(iii)	Swivel Chairs	Nos	5
11	**Display**	Lot	1
(i)	55" LED Display with 2 nos. HDMI port, USB port	No.	1

* To be provided with valid licence

\# One set consists of all hardware required for specified applications

TABLE B-2: SITE ITEMS

Sl. No	Description	Unit	Quantity
1	**Smart Energy Meters**		
(i)	Single Phase Smart Meter	Nos.	5069
(ii)	Three phase Smart Meter (whole current meter)	Nos.	191
(iii)	CT Operated Three phase meter (except CT)	Nos.	15
2	**Data Concentrator Unit**		
	Data Concentrator Unit (DCU) as required for all type of smart meters(Single Phase smart meter, three phase smart meter , CT operated smart meter, AMR meter etc) **	Lot	1
	*** DCU shall receive information through PLC/RF from all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS/3G or any other communication to MDAS at control centre.*		
3	Hand Held Unit (HHU)	Nos.	5

4	Poly carbonate Meter Box	Nos	5275
5	FRP Board	Nos	5275

TABLE B-3: TRAINING

Sl. No	Description	Unit	Quantity
1	**Training module at Site**		
(i)	Smart Meter, DCU and associated Communication	Man days	25
(ii)	MDAS & MDM, PLM database & User Interface	Man days	15
(iii)	Computer System H/W & Software	Man days	15
2	**Training module at Contractor facility**		
(i)	MDAS & MDM, PLM & Protocol	Man days	25
(ii)	Database & Display	Man days	15
(ii)	Application s/w (MDA,MDM,PLM)	Man days	20

TABLE B-4: MAINTENANCE

Sl. No	Description	Unit	Quantity
(i)	Maintenance of complete AMI & PLM System	year	5
(ii)	Extended maintenance of complete AMI & PLM system	year	2

---------- End of this Appendix----------

APPENDIX-C

DATA REQUIREMENT SHEET

Appendix - C Data Requirement Sheet

TABLE C-1.1: SERVERS

MDAS, MDM, PLM and other software for analytics:

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Application		
2	Make		
3	Model No.		
4	Specification	As per the base runtime requirement of CPU 2006 bench marking standards	
5	RAM	64 GB (expandable up to 100 %)	
6	Internal Auxiliary memory(in RAID-1) configuration	300GB delivered shall be configured in RAID-1 (150 + 150 GB) further expandable up to 600GB hot pluggable	
7	External Auxiliary Memory (SAN connectivity at 10 Gbps)	Minimum 5TB effective capacity configured on RAID Level 5 along with required interfaces.	
8	Optical Drive	Not Required or Blue-ray (R+W)	
9	Interfaces	1 Gb dual Ethernet ports	
10	Power Supply	Dual AC Power Supply	
11	User interface	Through a common TFT monitor, keyboard & mouse connected through KVM Switch in a server rack.(IP based)	
12	Mounting	Rack mountable	

TABLE C-1.2 WORKSTATION CONSOLES/REMOTE CONSOLE

S. No	Description of the Features	As per Technical Specification	As per Bidder offering

1	Make & Model No.		
2	Spec	As per the base runtime requirement of CPU 2006 bench marking standards	
3	RAM	8GB	
4	Internal Auxiliary memory	150GB delivered, expandable up to 300GB	
5	Internal Optical Drive	Blu-ray (R+W)	
6	Speakers	Two external speakers	
7	Interfaces	1 Gb dual Ethernet ports USB Ports	
8	Power Supply	Dual AC Power Supply	
9	User interface	Two 24" wide screen (16:9 aspect ratio), HD Resolution (1920x1080) TFT Colour monitors, keyboard & optical mouse	
10	Mounting	Desktop mounting	

TABLE C-1.3: COLOUR MONITORS

TFT Monitor for Work Stations:

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Make		
2	Model No.		
3	Diagonal Viewable size	24"	
4	Colour support	16.7 million	
5	On screen control	Required	
6	Anti glare & anti static	Yes	
7	Tilt , Swivel	Yes	

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
8	Aspect ratio	16:9	

TABLE C-1.4: MONITOR FOR SERVER

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Make		
2	Model No.		
3	Diagonal Viewable size	17”	
4	Colour support	16.7 million	
5	On screen control	Required	
6	Anti glare & anti static	Yes	
7	Tilt , Swivel	Yes	
8	Aspect ratio	16:9	

TABLE C-1.5: FIREWALL

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Make		
2	Model No.		
3	Specification	8 Ethernet Ports (1gbps) and 4 Fiber Optic Ports	
4	Data encryption support	3DES (168 bits), AES 128-, 192-, 256- bit and hashing algorithm like MD5 , SHA-1, IKE, PKI (X.509) and IKEv2 with EAP	
5	Support Active-Active mode	Yes	

6	High Availability & Load balancing	Yes	
7	Support NAT, PAT & Policy based NAT/PAT, Mapped IP (MIP), Virtual IP(VIP) & MIP/VIP grouping	Yes	
8	IP address assignment features	PPPoE, DHCP	
9	Support VoIP protocols	H.323, SIP, MGCP, SCCP	
10	IPv6 features	Syn Cookie, Syn-proxy DoS attack detection, SIP, RSTP, Sun-RPC, ALG's, RIPng, BGP4, DHCPv6 Relay, IPv4 to IPv6 translations & Encapsulations.	
11	System management	Using web UI, Command Line interface (console/telnet/SSH).	
12	Filtering of packets based on Source address, destination address, protocol type, user, port number, URL.	Yes	
13	Filtering of protocols	FTP, SMTP, HTTP, HTTPS, SNMP, UDP, ICMP, RPC, DNS, DHCP, ARP, TCP, POP3	
13	Authentication protocols	RADIUS, LDAP and PKI methods	
14	Dynamic routing protocols	RIP v2, OSPF, & BGP	
15	DoS & DDoS prevention	Yes	
16	TCP reassemble for fragmented packet protection	Yes	
17	Brute Force attack	Yes	

	mitigation		
18	SYN cookie protection	Yes	
19	Zone based IP spoofing	Yes	
20	Malformed packet protection	Yes	
21	DNS guard features	Yes	
22	Content filtering	JAVA & ActiveX blocking	
23	Antivirus, anti-worm, anti-spam and anti-spyware protection	Yes	
24	System Logging & monitoring	Syslog, Email, SNMPv2 and VPN Tunnel Monitor.	
25	Stateful packet inspection	Yes	
26	Assign zones to virtual & physical interfaces	Yes	

Sizing Parameters for each Firewall:

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Make		
2	Model No.		
3	No. of unique users	Unlimited	
4	Minimum number of concurrent sessions	500	
5	Minimum new sessions per second processing	500	
6	Minimum Firewall throughput	1 Gbps	
7	Minimum 3DES/AES VPN throughput	250 Mbps	
8	No of VLANs	100	
9	Minimum IPSec VPN peers	100	
10	Number of 1 Gbps LAN ports	12	

TABLE C-1.6: ROUTER

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Make		
2	Model No.		
3	Functions	High performance Routing for data exchange between data centres, remote WorkStation, DCU, Internet cloud.	
4	Routing Capability	Layer-2 & Layer-3 routing & Dynamic	

		discovery of routing	
5	Processing capacity	Minimum 2 Mbps	
6	Features to support	QoS, MPLS, Security, Broadband, Multiservice, Voice, IP to IP Gateway	
7	Routing protocols	EIGRP, IGRP, IS-IS, OSPF, BGP, ARP, IPCP, IP forwarding, VLAN & MPLS etc.	
8	Network protocols	TCP/IP, IPv6, IPv4, OSI, Telnet, UDP, DHCP	
9	Network management	Using SNMP Protocol	
10	Inbuilt security features	f. Data encryption supported DES (56 BITS) 3des (168 bits) and hashing algorithm like MD5 and SHA-1 g. Filtering of packets based on Source address, Destination address, Protocol type, User, Port number, URL h. Filtering of Protocols such as FTP, SMTP, HTTP, SNMP, UDP, ICMP, RPC, DNS, DHCP, ARP i. Minimum 100 IPSec VPN tunnels support j. Detailed system logging	
11	Speed configurability at each port	All ports shall be configurable from 64kbps to 2Mbps	
12	Interface ports	1000Mbps LAN ports – 2 V.35/G.703 Ports as per the system requirement. There shall be 50% spare ports.	
13	Mounting	Rack mountable	

TABLE C-1.7: PANELS-42 U RACK

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Make		
2	Model No.		

3	Functions	For mounting or placement of equipment	
4	Mounting	Floor mounted with front & rear access to hardware and wiring	
5	Cable entry	Bottom	
6	Internal lighting lamp	Yes, with door interlock	
7	230V AC, 15/5 A Internal power socket with switch	12	
8	All material used in the panel are flame retardant	Yes	
9	All Louvers provided with suitable wire mesh	Yes	

TABLE C-1.8: SWITCH

Servers and peripheral devices are connected to each other on a local area network (LAN). Dual LAN is envisaged for the System.

S.No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Make		
2	Model No.		
3	Functions	24 ports for connecting Workstation, servers, screen & peripheral devices on Local Area Network (LAN).	
4	Conform to standards	ISO8802 or IEEE 802 Series Standards	
5	Switching capability	Layer-3 switching & VLAN	
6	Interface ports	** Minimum 8- 1Gbps Ethernet ports	
7	Cable standard	Cat 6 or higher bandwidth cable	

8	Mounting	Rack mountable	
9			

***** However, the no of ports in a LAN switch shall be as per the network architecture & the no of servers/devices on that LAN.***

TABLE C-1.9: SAN (STORAGE AREA NETWORK) BASED STORAGE

S. No	Description of the Features	As per Technical Specification	As per Bidder offering
1	Manufacturer		
2	Model No.		
3	Capacity	Minimum 5 TB usable	
4	Spare HDD	1 Nos.	
5	Expandability	100%	
6	RAID level	5	
7	SAN Type(10 Gbps connectivity with server))	iSCSi	
8	Snapshot feature	Yes	
9	Hard Drives speed	15000 rpm	
10	Hot swappable Hard Drives	Yes	
11	Interface ports	Dual LAN (Gigabit ports)	
12	NAS Support	Yes	
13	High Availability Mode(Dual Controller)	Yes	
14	Dual Power Supply	Yes	
15	Power Supply (in Watts)		
16	Heat Load		
17	SAN Switch	Minimum 24 ports	

TABLE C-1.10: COLOR LASER PRINTER

S.No	Description of the Features	As per Technical Specification	As per Bidder offering
1.	Make		
2.	Model No.		
3.	Functions	Print,	
4.	Paper size	A3, A4	
5.	Print speed	30 Colour pages/minute of A4 size & 15 Colour pages/minute of A3 size.	
6.	Print resolution	1200x1200 dpi	
7.	Paper weight	75-200 GSM	
8.	First page out time	4 sec for Black & White, 7 sec for Colour	
9.	Duty cycle	100000 pages per month	
10.	Paper handling capacity	Minimum 500 sheets for input tray & 500 sheets for output tray.	
11.	Landscape and portrait orientation	Yes	
12.	Interface	1GB dual LAN ports	
13.	Heat Load		

TABLE C-1.11: BLACK & WHITE LASER PRINTER (MULTIFUNCTION DEVICE)

S.No	Description of the Features	As per Technical Specification	As per Bidder offering
13.	Make		
14.	Model No.		
15.	Functions	i) Print, ii) Scan	

		iii) Copy iv) Fax	
16.	Paper size	A3, A4	
17.	Print speed	30 pages/minute of A4 size & 15 pages/minute of A3 size.	
18.	Print resolution	1200x1200 dpi	
19.	Scan resolution	600x600 dpi	
20.	Paper weight	75-200 GSM	
21.	First page out time	4 sec	
22.	Duty cycle	100000 pages per month	
23.	Paper handling capacity	Minimum 500 sheets for input tray & 500 sheets for output tray.	
24.	Automatic Duplex printing	Yes	
25.	Landscape and portrait orientation	Yes	
26.	Interface	1GB dual LAN ports	
27.	Heat Load		

TABLE C-1.12: GPS BASED TIME FACILITY

S.No	Description of the Features	As per Technical Specification	As per Bidder offering
8.	Make		
9.	Model No.		
10.	Time stability of internal time base	Minimum 2ppm	
11.	Propagation delay compensation	Yes	
12.	Include an offset to permit correction to local time	Yes	

13.	Reverting to internal time base upon loss of signal from UTC source	Yes	
14.	Resynchronization Delay	Not more than 5 minutes.	
15.	Accuracy of resynchronization	< 1.5 Micro Sec	
16.	Interfaces	Ethernet ports - 2 IRIG-B port - 2	
17.	Power Supply (in Watts)		
18.	Heat Load		

TABLE C-1.13: DIGITAL DISPLAYS FOR GPS BASED TIME FACILITY

S.No	Description of the Features	As per Technical Specification	As per Bidder offering
9.	Make		
10.	Model No.		
11.	Functions	For viewing UTC day of the year and time and frequency	
12.	Day display format	XXX (MON through SUN)	
13.	Time Display format	24 Hours, HH:MM:SS, where hour display will be from 00 to 23 hours format.	
14.	Date format	MM: DD: YY	
15.	Frequency display format	XX.XX Hz	
16.	Display digit requirements	Display Digit height >7.5cm	
17.	Mounting of displays	Wall/panel mounting	
18.	SCADA Interfaces	Frequency	
19.	Power Supply (in Watts)		

S.No	Description of the Features	As per Technical Specification	As per Bidder offering
20.	Heat Load		

TABLE C-2.1: SINGLE PHASE SMART METER

S.N.	Particulars	As per Technical Specification	As per Bidder offering
1	Manufacturer Name & address		
2	Make		
3	Type/Model no		
4	Country of origin		
5	Applicable Standards	The meters shall comply with IS 13779.	
6	Reference Voltage	240 V (-40% to +20%) Single Phase	
7	Current Rating	5-30 A	
8	Accuracy	Class 1.0 as per IS 13779 for Active Energy	
9	Time period for retaining billing parameters	2 months	
10	Demand integration period	Settable integration period 30/15 minutes.	
11	Guarantee	Manufacturer Shall undertake a guarantee to replace meter up to a period of 5 year from the date of operation.	
12	Maximum size of cable which can be connected at terminal		
13	Is the meter type tested as per IS 13779 and is the type test report enclosed.		

14	Type material use - Meter base - Meter cover -Terminal block -Terminal Cover - Screw • Material • size		
15	Internal Diameter of terminal hole		
16	Centre to centre clearance between adjacent terminals		
17	Type of register a) Nos of digits b) Size of numerals		
18	Display a) Parameters on auto display b) Parameters on Push button c) Type of Push Button		
19	Life & Type of battery of real time clock		
20	Life of battery for display during power off condition		

21	Approximate Weight of meter		
22	Approximate size of meter		
23	BIS licence no & date with its validity for ISI certification mark on offered meter		
24	Details of testing facility available at manufacturer premises.		

TABLE C-2.2: THREE PHASE SMART METER

S.N.	Particulars	As per Technical Specification	As per Bidder offering
1	Manufacturer Name & address		
2	Make		
3	Type/Model no		
4	Country of origin		
5	Applicable Standards	The meters shall comply with IS 13779.	
6	Reference Voltage	3x230 V phase to neutral	
7	Current Rating	10-60A	
8	Accuracy	Class 1.0 as per IS 13779 for Active Energy	
9	Time period for retaining billing parameters	2 months	
10	Demand integration period	Settable integration period 30/15 minutes.	
11	Guarantee	Manufacturer Shall undertake a guarantee to replace meter up to a period of 5 year from the date of operation.	
12	Maximum size of cable which can be connected at terminal		
13	Is meter is type tested as per IS 13779/, is the type test report enclosed.		
14	Type material use - Meter base - Meter cover		

	- Terminal block - Terminal Cover - Screw • Material • size		
15	Internal Diameter of terminal hole		
16	Centre to centre clearance between adjacent terminals		
17	Type of register c) Nos of digits d) Size of numerals		
18	Display a) Parameters on auto display b) Parameters on Push button c) Type of Push Button		
19	Life & Type of battery of real time clock		
20	Life of battery for display during power off condition		
21	Approximate Weight of meter		
22	Approximate size of meter		
23	BIS licence no & date with its validity for ISI certification mark on offered meter		
24	Details of testing facility available at manufacturer		

	premises.		

TABLE C-2.3: THREE PHASE CT OPERATED METER

S.N.	Particulars	As per Technical Specification	As per Bidder offering
1	Manufacturer Name & address		
2	Make		
3	Type/Model no		
4	Country of origin		
5	Applicable Standards	The meters shall comply with IS 14697.	
6	Reference Voltage	3x240V phase to neutral	
7	Current Rating	-/5A	
8	Accuracy	Class 0.5 as per IS 14697	
9	Time period for retaining billing parameters	2 months	
10	Demand integration period	Settable integration period 30/15 minutes.	
11	Guarantee	Manufacturer Shall undertake a guarantee to replace meter up to a period of 5 year from the date of operation.	
12	Maximum size of cable which can be connected at terminal		
13	Is meter is type tested as per IS 13779/, is the type test report enclosed.		

14	Type material use - Meter base - Meter cover - Terminal block - Terminal Cover - Screw • Material • size		
15	Internal Diameter of terminal hole		
16	Centre to centre clearance between adjacent terminals		
17	Type of register a) Nos of digits b) Size of numerals		
18	Display c) Parameters on auto display d) Parameters on Push button e) Type of Push Button		
19	Life & Type of battery of real time clock		
20	Life of battery for display during power off condition		
21	Approximate Weight of meter		
22	Approximate size of meter		
23	BIS licence no & date with its validity for ISI certification mark on		

	offered meter		
24	Details of testing facility available at manufacturer premises.		

TABLE C-2.4: DATA CONCENTRATOR UNIT (DCU)

S.N.	Particulars	As per Technical Specification	As per Bidder offering
1	Manufacturer Name & address		
2	Make		
3	Type/Model no		
4	Country of origin		
5	Applicable Standards		
6	Power supply shall be suitable for 3-phase, 3x240V phase to neutral, -40% +20%, 50 Hz AC, so that even in case of outage in one or two phases, DCU can be powered through the healthy phase. Capable of withstanding surges & voltage spikes of 6KV as per IEC 61000-4-5 standards. Power supply shall be terminated on suitable sized MCB to facilitate isolation during in-situ maintenance.		
7	DCU shall be capable to handle data of minimum 50 nos of any type of smart meter (1ph/3ph). DCU shall be able to acquire and		

S.N.	Particulars	As per Technical Specification	As per Bidder offering
	send data to MDAS for full capacity (No. of meters/field devices it is designed for) within a period of 3 minutes. Full capacity (nos of meters DCU can handle) of DCU is required to be indicated in the offer.		
8	DCU shall be able to communicate with the nearest meters at a distance of at least 50 m, depending on topographical features. For further communication among the meters distance of the other meters with the DCU shall not be a constraint as communication of the nearest meters shall be established with other meters through appropriate mesh formation/other formation.		
9	DCU tested for EMC and EMI capability as per IEC 61000 for following: • Radio interference measurement • Fast transient burst test • Test of immunity to electrostatic discharges • Test of immunity to electromagnetic HF		

S.N.	Particulars	As per Technical Specification	As per Bidder offering
	field • The bidder shall provide IP 55 compliance test certificate.		

TABLE C-2.5: HAND HELD UNIT (HHU)

S.N.	Particulars	As per Technical Specification	As per Bidder offering
1	Manufacturer Name & address		
2	Make		
3	Type/Model no		
4	Country of origin		
5	Applicable Standards		
6	Physical Characteristics: a. Size of HHU b. Weight: Weight of HHU including batteries shall be less than 1.0 kg. c. Enclosure: HHU casing shall be of electrical insulating material of high thermal stability and mechanical strength. Its degree of protection confirms to IP 67 LEVEL (2) as per IS 12063 / IEC-529. The enclosure should be solvent resistant and shall be provided with a suitable holding strap for proper gripping. d. Ruggedness: HHU is able to withstand harsh field environment without physical damage or loss of data. e. Display: The display of HHU to have the following		

S.N.	Particulars	As per Technical Specification	As per Bidder offering
	characteristics: I. Easy readability in varying ambient light conditions. II. 4 lines and 20 characters per line on the screen III. The size of the character shall be 4 mm IV. The contrast and intensity control to get a clear display in varying ambient light. f. Key Board: The keyboard of the HHU to have the following attributes: I. Long operation life i.e. minimum 100000 operations II. Feedback for key press acknowledgement to user. III. Legible and non-fading keypad imprints for all alphanumeric characters/symbols. IV. Each English alphabet shall have a separate key. g. Input / Output ports (I/O Ports) : The HHU shall be having two serial input/output Ports; one		

S.N.	Particulars	As per Technical Specification	As per Bidder offering
	port shall be serial port RS 232C compatible. Another optional port can be used for convenience of connecting peripherals such as bar code reader, printer, battery charger, loader charger etc. h. The offered HHU shall be able to provide power supply for optical sensor used for meter reading applications.		
12	The interface between a meter and HHU to consist of 2 parts. a. Meter optical sensor terminating in to a 9 pin D type male connector with a cable of 500 mm +/- 10 mm. Length. b. The interface between a meter and the offered HHU shall be with a flexible shielded cable of length 1500mm +/ 10mm having 9 pin D type female connector with electrical circuit. This cable shall be supplied along with HHU. The two ends of the cable is stress relieved.		

TABLE C-2.6: PEAK LOAD MANAGEMENT (PLM)

S.N.	Requirement	As per Bidder offering
1	Consumer category wise Time of Use (ToU) tariff on daily/weekly/monthly/ quarterly, etc shall be made available on the consumer portal.	
2	Daily load forecasting for the project area on hourly basis.	
3	Import hourly drawl schedule (to be made available by the Utility) for the project area.	
4	Load Profiles for time of day, day of week (weekday, Saturday/Sunday, holidays, festivals), monthly, annually across consumer meters, distribution transformer, feeder and system level.	
5	Analysis of Surplus/ Deficit situation in daily drawl schedule. Based on the above analysis design demand response (DR) and demand management programs. Command to be given to MDM for reduction of drawl limit for identified group of consumers. Notification for the modification in drawl limit to be sent to the consumers via SMS, email, etc. as well as made available on the consumer portal. Segmentation of consumer based on past consumption pattern. Anticipation of load which may be high in future. Compare load profiles of different consumers (residential, commercial, HT and DT) Analytical process for incentivizing program for optimal ToU pricing. List of potential customers that may adopt or accept a 'Power Reward' program	
6	On completion of demand response event drawl limit of the above consumers to be restored.	

----------End of this Appendix----------

APPENDIX-D

System Sizing Requirements

Appendix - D System Sizing Requirements

D - 1. Sizing Parameter

The system shall be designed as per the technical parameters defined in this specification and as specified in this Appendix.

The system (Servers, Historian, NMS etc.) shall be suitably sized based on data to be captured from all field devices with 100% expansion.

The auxiliary memory utilization of any of the Servers shall not exceed 50% of its delivered capacity at any time even under peak loading conditions like-

- 200 alarms per minutes for 5 minutes.
- 10 display request simultaneously from 5 users.
- Restoration of 100% meter data after system failure.
- System activity alarms.

This memory utilization includes the memory used for storage of data (including expansion requirement defined in above para) for the defined duration as specified in the technical specification

Configuration requirement for Hardware & Software

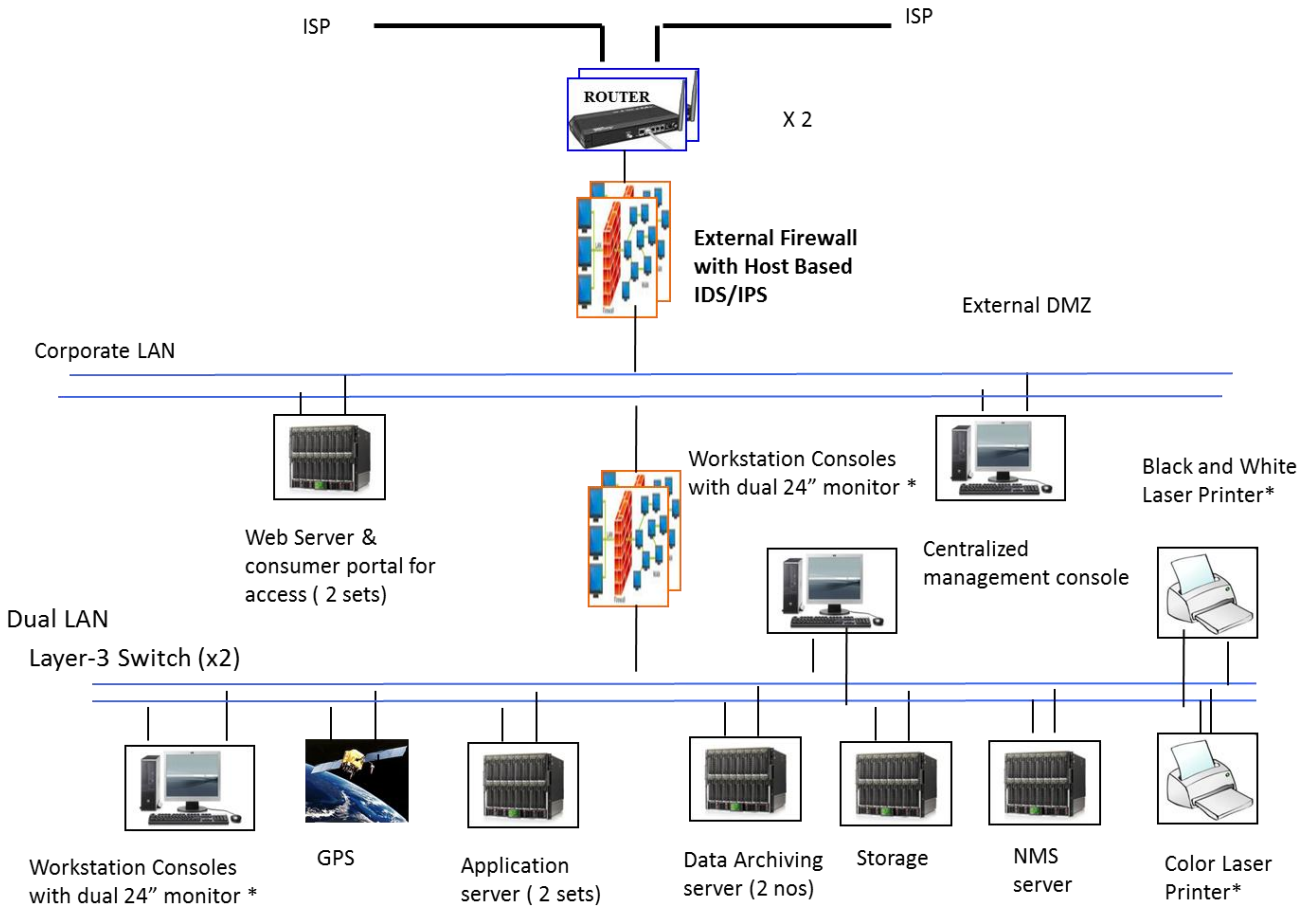
S.no	Description	No of smart meters	Future requirement
1	Meter Data Acquisition System(MDAS)	6000	100 % expansion
2	Meter Data Management System(MDM)	6000	100 % Expansion
3	Peak Load Management (PLM)	6000	100 % Expansion

----------End of this Appendix----------

APPENDIX-E

Proposed Network Architecture

Appendix - E Proposed Network Architecture



* Furniture to be provided by contractor for these items

APPENDIX-F

DLMS/COSEM Interoperability Profile

Appendix - F DLMS/COSEM Interoperability Profile

DCU may exchange data from Smart Meters using any protocol. However, DCU will communicate with MDAS in DLMS/COSEM based protocol for defined parameter as given below to achieve interoperability at MDAS level server of DCU shall offer following functionalities to MDAS

DCU shall communicate with MDAS and shall support following functionalities:

- Retrieve meter data from DCU using Pull mode. It shall be possible to pull data of individual meter or the entire meters under DCU via a single command.
- Retrieve meter data from DCU using Push mode. It shall be possible to push data of individual meter or the entire meter under DCU.
- Programming of meters: Following programming of meter shall be possible through MDAS.
    - Load profile capture period
    - Demand integration period
    - Setting of activity calendar for time of day billing.
    - Billing date
    - Clock setting
    - Connect disconnect relay load curtailment limit – current limit, voltage limit, power limit.
    - Event setting for connect disconnect
    - Number auto reconnection attempt
    - Time interval between auto reconnection attempt
    - Lock out period for relay.
    - Remote firmware upgrade
    - Password setting
    - Push schedule
    - Setting threshold limits for monitored parameters
    - Provision for adding more programming features in future.
- Retrieving meter programming result
- Methodology/Format for above implementation of above functionality in DLMS/COSEM based protocol shall be submitted to Employer for finalisation.
- Performance parameters in terms of Latency, duty cycle, capacity etc. for various activities as proposed above shall be included in the bidding document.

F - 1. Parameters to be captured for Single Phase Meter

TABLE-F-1 INSTANTANEOUS PARAMETERS

S.N.	Parameter	Unit
1	Real Time Clock – Date and Time	
2	Voltage	Volts
3	Phase current	Ampere
4	Active Power	kW
5	Apparent Power	kVA
6	Signed Power Factor	
7	Cumulative Energy	kWh
8	Maximum Demand,	kW

TABLE-F.2 BLOCK LOAD PROFILE

S.N.	Parameter	Unit
1	Real Time Clock – Date and Time	
2	Block Energy	kWh
3	Average voltage	Volts
4	Average current	Ampere
5	Demand	KW
6	Demand	KVA
7	Power factor	

TABLE-F-3 DAILY LOAD PROFILE

S.N.	Parameter	Unit
1	Real Time Clock – Date and Time	
2	Cumulative Energy	kWh

TABLE-F-4 NAME PLATE DETAILS

S.N.	Parameter
1	Meter serial no
2	Manufacturer name
3	Firmware version for meter
4	Meter type
5	Category
6	Current rating
7	Meter year of manufacture

TABLE-F-5 BILLING PROFILE

Sl. No.	Parameter	Unit
1	Billing date	
2	Average Power Factor for billing period	
3	Cumulative Energy, kWh	kWh
4	Cumulative Energy for TZ1	kWh
5	Cumulative Energy for TZ2	kWh
6	Cumulative Energy for TZ3	kWh
7	Cumulative Energy for TZ4	kWh

8	MD, kW	kW
9	MD kW for TZ1	kW
10	MD kW for TZ2	kW
11	MD kW for TZ3	kW
12	MD kW for TZ4	kW
13	MD, kVA	kVA
14	MD, kVA for TZ1	kVA
15	MD, kVA for TZ2	kVA
16	MD, kVA for TZ3	kVA
17	MD, kVA for TZ4	kVA

F-1.1. Events

TABLE-F-6 VOLTAGE RELATED EVENTS

S.N.	Parameter	Unit
1	Over voltage - Occurrence	
2	Over voltage - Restoration	
3	Low voltage - Occurrence	
4	Low voltage - Restoration	

TABLE-F-7 CURRENT RELATED EVENTS

S.N.	Parameter	Unit
1	Over Current - Occurrence	
2	Over Current - Restoration	

TABLE-F-8 POWER RELATED EVENTS

S.N.	Parameter	Unit

1	Power failure - Occurrence	
2	Power failure - Restoration	

TABLE-F-9 NON ROLL OVER EVENTS

S.N.	Parameter	Unit
1	Meter cover open - Occurrence	

TABLE-F-10 CONTROL EVENTS

S.N.	Parameter	Unit
1	Malfunctioning of relay - Occurrence	
2	Connect	
3	Disconnect	

TABLE-F-11 OTHER EVENTS

S.N.	Parameter	Unit
1	Influence of Permanent Magnet or AC/ DC Electromagnet – Occurrence	
2	Influence of Permanent Magnet or AC/ DC Electromagnet - Restoration	
3	DC signal injection in source/load neutral terminal of the Meter through Diode / Rectifier or Neutral Disturbance – HF - Occurrence	
4	DC signal injection in source/load neutral terminal of the Meter through Diode / Rectifier or Neutral Disturbance – HF - Restoration	
5	Single wire operation (Neutral missing) – Occurrence	
6	Single wire operation (Neutral missing) –	

	Restoration	

TABLE-F-11 CAPTURE PARAMETERS FOR EVENTS

S.N.	Parameter	Unit
1	Date and time of event	
2	Event code	
3	Current	Ampere
4	Voltage	Volts
5	Power factor	
6	Cumulative energy	kWh

F - 2. Parameters to be captured for Three Phase Meter

TABLE-F-12 INSTANTANEOUS PARAMETERS

S.N.	Parameter	Unit
1	Real Time Clock – Date and Time	
2	Voltage – V RN	Volts
3	Voltage – V YN	Volts
4	Voltage – V BN	Volts
5	Current - I R	Ampere
6	Current - I Y	Current - I R
7	Current - I B	Current - I R
8	Active Power	kW
9	Signed Reactive power	kVar

10	Apparent Power	kVA
11	Three phase Power Factor	
12	Cumulative Energy	kWh
13	Demand,	kW
14	Maximum Demand,	kW

TABLE-F-13 BLOCK LOAD PROFILE

S.N.	Parameter	Unit
1	Real Time Clock – Date and Time	
2	Block Energy	kWh
3	Average voltage - V RN	Volts
4	Average voltage - V YN	Volts
5	Average voltage - V BN	Volts
6	Average current – I R	Ampere
7	Average current – I Y	Ampere
8	Average current – I B	Ampere
9	Cumulative energy	kVah
10	Cumulative energy	kVarh (lag/lead)
11	Demand	KVA
12	Demand	KW
13	Power factor	

TABLE-F-14 DAILY LOAD PROFILE

S.N.	Parameter	Unit
1	Real Time Clock – Date and Time	
2	Cumulative Energy	kWh

3	Cumulative energy	kVah
4	Cumulative energy	kVarh (lag/lead)

TABLE-F-15 NAME PLATE DETAILS

S.N.	Parameter
1	Meter serial no
2	Manufacturer name
3	Firmware version for meter
4	Meter type
5	Category
6	Current rating
7	Meter year of manufacture

TABLE-F-16 BILLING PROFILE

Sl. No.	Parameter	Unit
1	Billing date	
2	Average Power Factor for billing period	
3	Cumulative Energy, kWh	kWh
4	Cumulative Energy for TZ1	kWh
5	Cumulative Energy for TZ2	kWh
6	Cumulative Energy for TZ3	kWh
7	Cumulative Energy for TZ4	kWh
8	Cumulative Energy, kVAh	kVAh
9	Cumulative Energy for TZ1	kVAh

10	Cumulative Energy for TZ2	kVAh
11	Cumulative Energy for TZ3	kVAh
12	Cumulative Energy for TZ4	kVAh
13	Cumulative Energy	kVArh (lag/lead)
14	MD, kW	kW
15	MD kW for TZ1	kW
16	MD kW for TZ2	kW
17	MD kW for TZ3	kW
18	MD kW for TZ4	kW
19	MD, kVA	kVA
20	MD, kVA for TZ1	kVA
21	MD, kVA for TZ2	kVA
22	MD, kVA for TZ3	kVA
23	MD, kVA for TZ4	kVA
24	Cumulative temper count	

F-2.1. Events

TABLE-F-17 VOLTAGE RELATED EVENTS

S.N.	PARAMETER	UNIT
1	OVER VOLTAGE IN ANY PHASE- OCCURRENCE	
2	OVER VOLTAGE IN ANY PHASE - RESTORATION	
3	LOW VOLTAGE IN ANY PHASE- OCCURRENCE	
4	LOW VOLTAGE IN ANY PHASE - RESTORATION	

TABLE-F-18 CURRENT RELATED EVENTS

S.N.	Parameter	Unit
1	Over Current in R phase - Occurrence	
2	Over Current in R phase - Restoration	
3	Over Current in B phase - Occurrence	
4	Over Current in B phase - Restoration	
5	Over Current in Y phase - Occurrence	
6	Over Current in Y phase - Restoration	

TABLE-F-19 POWER RELATED EVENTS

S.N.	Parameter	Unit
1	Power failure - Occurrence	
2	Power failure - Restoration	

TABLE-F-20 NON ROLL OVER EVENTS

S.N.	Parameter	Unit
1	Meter cover open - Occurrence	

TABLE-F-21 CONTROL EVENTS

S.N.	Parameter	Unit

1	Malfunctioning of relay - Occurrence	
2	Malfunctioning of relay - Restoration	
3	Connect	
4	Disconnect	

TABLE-F-22 OTHER EVENTS

S.N.	Parameter	Unit
1	Influence of Permanent Magnet or AC/ DC Electromagnet – Occurrence	
2	Influence of Permanent Magnet or AC/ DC Electromagnet - Restoration	
3	DC signal injection in source/load neutral terminal of the Meter through Diode / Rectifier or Neutral Disturbance – HF - Occurrence	
4	DC signal injection in source/load neutral terminal of the Meter through Diode / Rectifier or Neutral Disturbance – HF - Restoration	

TABLE-F-23 CAPTURE PARAMETERS FOR EVENTS

S.N.	Parameter	Unit
1	Date and time of event	
2	Event code	
3	Current Ir	Ampere
4	Current Ib	Ampere
5	Current Iy	Ampere
6	Voltage Vrn	Volts
7	Voltage Vyn	Volts

8	Voltage Vbn	Volts
9	Power factor	
10	Cumulative energy	kWh
11	Cumulative energy	kVAh
12	Cumulative energy	kVarh

----------END OF THIS APPENDIX----------

Sl. No	Clause Reference	Existing Provision	Amended Provision
1	Vol. II, Clause 5.4.2., Pg No. 115	Import / Export CADD Drawings The display generator shall support the import of drawings, including power system one-line diagrams, developed by Employer/Owner on Auto CAD. The display generator should have the capability to import the files from latest version of AUTOCAD including older versions for display generation.	DELETED
2	Vol. II, Clause 5. 2.6.2., Pg No. 75	MDM shall flag, alarm and trigger an estimating process including but not limited to when the following anomalies occur in the cumulative ("CUM") register reads □ CUM Decrements within a billing cycle □ CUM reads increments more than configurable threshold □ Future or old read dates □ Number of digits exceeds number of meter dials	MDM shall flag, alarm and trigger an estimating process including but not limited to when the following anomalies occur in the cumulative ("CUM") register reads □ CUM Decrements within a billing cycle □ CUM reads increments more than configurable threshold □ Future or old read dates □ Number of meter display digits exceeds
3	Vol II, Clause 2.1, Pg. No. 22	Smart Meter (Single phase, Three phase and CT operated meters) for consumers shall be provided based on any proven communication technology. The Contractor may use any protocol from Smart Meter to DCU. The DCU to MDAS shall use GPRS/GSM/3G communication and protocol shall be DLMS/COSEM. The Contractor shall ensure the proper data exchange among MDM, MDAS, DCU and Smart Meters as part of fully functional AMI system.	Smart Meter (Single phase, Three phase and CT operated meters) for consumers shall be provided based on any proven communication technology. The Contractor may use any protocol from Smart Meter to DCU. The DCU to MDAS shall use GPRS/GSM/3G communication and protocol shall be DLMS/COSEM. The Contractor may also provide router based solution provided end to end functionalities (i.e. Smart Meter to MDM) as envisaged in this technical specification is achieved. The Contractor shall ensure the proper data exchange among MDM, MDAS, DCU and Smart Meters as part of fully functional AMI system.
4	Vol II, Clause 1.6 (14), Pg. No. 12	GSM/GPRS SIM cards and 2x2 Mb/s static ISP connection in control room	GSM/GPRS SIM cards or any other alternative communication and 2x2 Mb/s static ISP connection in control room

Sl. No	Clause Reference	Existing Provision	Amended Provision
5	Vol. II, Appendix B, Table B-2, Pg. No. 170	** DCU shall receive information through PLC/RF from all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS/3G to MDAS at control centre.	** DCU shall exchange information through PLC/RF with all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS/3G or any other communication to MDAS at control centre.
6	Vol II Appendix B, Table B2 Pg. No. 170	** DCU shall receive information through PLC/RF from all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS/3G to MDAS at control centre.	** DCU shall receive information through PLC/RF from all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS/3G or any other communication to MDAS at control centre.
7	Vol. II, Clause 2.2.1, Pg. No. 30	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field.	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field in secure manner.
8	Vol. II, Clause 2.2.2, Pg. No. 46	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field.	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field in secure manner.
9	Vol. II, Clause 2.2.3., Pg. No. 59	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field.	The meter shall support remote firmware upgrades as well remote configuration in order to remotely add new features and functions to meters without having to send person to field in secure manner.
10	Vol. II, Clause 2.3.1., Pg. No. 67	DCU shall consume minimum power for its operation. It shall also have rechargeable battery/Super Capacitors with backup for 1 hour for normal meter reading and to push tamper event and carry out on demand reading and the network health status / connectivity continuity & check. DCU should have feature to send power outage and restoration message to the MDAS. The battery shall have a guaranteed life of 10 years.	DCU shall consume minimum power for its operation. It shall also have rechargeable battery with backup for 1 hour for normal meter reading and to push tamper event and carry out on demand reading and the network health status / connectivity continuity & check. DCU should have feature to send power outage and restoration message to the MDAS. The battery shall have a guaranteed life of 10 years.

Sl. No	Clause Reference	Existing Provision	Amended Provision
11	Vol. II, Clause 2.6.1.3., Pg. No. 75	The MDM shall accept input, process, store, and analyze Meter data from head end system (MDAS), hand held meter reading instruments and manual meter reads. In case of manual reads, provision should be there to insert associated notes like assessed energy, etc.	The MDM shall accept input, process, store, and analyze Meter data from MDAS and meter data collected through hand held meter reading instruments and manual meter reads. In case of manual reads, provision should be there to insert associated notes like assessed energy, etc.
12	Vol. II, Clause 2.6.6., Pg. No. 77	* The solution shall provide customers with access to current and historical consumption and interval data, outage flags, voltage and power quality indications. The data shall be displayed in graphical and tabular form depending on user choice.	* The solution shall provide customers with access to current and historical consumption and interval data, outage flags, voltage and power quality indications. The data shall be displayed in graphical and tabular form depending on user choice. * The Customer may also access data through customer portal
13	Vol. II, Clause 2.6.13., Pg. No. 81	The user interface performance testing shall be done as per following criteria- as per given table	As per Annexure I to Amendment 1
14	Vol. II, Clause 2.7.5., Pg. No. 86	The meter manufacturers are responsible for maintaining the security of the data extracted from the meters using manufacturer specific algorithm in the software up to down loading to BCS.	The contractor is responsible for maintaining the security of the data extracted from the meters using manufacturer specific algorithm in the software up to down loading to BCS.
15	Vol. II, Clause 5.3.7., Pg. No. 111	Identity and access management system should be installed to control and log the access control for all users. The access management system shall be role based.	Identity and access management system should be installed to control and log the access control for all users. The access management system shall be role based. Access Control shall not be integrated with RAPDRP System. Security Management System to protect systems and network from unauthorized access, manage user access, authorizing rights and privileges is to be provided.

Sl. No	Clause Reference	Existing Provision	Amended Provision
16	Vol. II, Clause 4.8., Pg. No. 93	All printers shall be interfaced with dual Ethernet LAN. Except for output capabilities unique to any printer type (such as extended character sets or graphic print capabilities), there shall be no limitations on the use of any printer to perform the functions.	All printers shall be interfaced with single Ethernet LAN. Except for output capabilities unique to any printer type (such as extended character sets or graphic print capabilities), there shall be no limitations on the use of any printer to perform the functions.
17	Vol. II, Clause 5.3.10, Pg. No. 111	· Security Management to protect systems and network from unauthorised access, manage user access, authorising rights and privileges.	DELETED
18	Vol. II, Clause 4.19., Pg. No. 97	Internal Auxiliary memory(in RAID-1) configuration: 300GB delivered, expandable up to 600GB	Internal Auxiliary memory(in RAID-1) configuration: 300GB delivered shall be configured in RAID-1 (150 + 150 GB) further expandable up to 600GB hot pluggable
19	Vol. II, Clause 2.2.2. , Pg. No. 44	Load Control limits such as maximum sanctioned load, brown out load etc. shall be remotely programmable.	Load Control limits shall be remotely programmable.
20	Vol. II, Clause 2.2.2(g), Pg. No. 64	The meter shall have an operational indication device such as blinking LED given type indication. The following indications are mandatory.	The meter shall have an operational indication device such as blinking LED / LCD given type indication. The following indications are mandatory.
21	Vol. II, Clause 2.3.2, Pg. No. 67	· DCU shall support DLMS/COSEM protocol for communication to MDAS and ensure secure communication to MDAS. Format of DLMS/COSEM is given in Appendix-F	· DCU shall support DLMS/COSEM protocol for transfer of DLMS / COSEM data to MDAS and ensure secure communication to MDAS. Format of DLMS/COSEM is given in Appendix-F.
22	Vol. II, Clause 2.3.3., Pg. No. 68	· The DCU also shall have Wide Area Network (WAN) connectivity to the MDAS through digital cellular GPRS/GSM/3G communication connection / Fiber optic communication. It shall have provision for modem with SIM slot for supporting Dual-band GSM/GPRS module with a valid communication terminal port i.e. RJ45/RS232 for other communication option shall also be provided. DCU modem should support GPRS/GSM SIM card. It shall support SIM card from any service provider.	· The DCU also shall have Wide Area Network (WAN) connectivity to the MDAS through digital cellular GPRS/GSM/3G communication connection / Fiber optic communication. In case of GPRS / GSM backhaul, it shall have provision for modem with SIM slot for supporting Dual-band GSM/GPRS module with a valid communication terminal port i.e. RJ45/RS232 for other communication option shall also be provided. DCU modem should support GPRS/GSM SIM card. It shall support SIM card from any service provider.

Sl. No	Clause Reference	Existing Provision	Amended Provision
23	Vol. II, Clause 2.5.4 , Pg. No. 73	· MDAS shall preferably interface with MDM on standard interfaces and the data exchange models and interfaces shall comply with CIM / XML / IEC 61968/62056/IS15959/Indian Companion Specification.	· MDAS shall preferably interface with MDM on standard interfaces and the data exchange models and interfaces shall comply with CIM / XML / IEC 61968.
24	Vol. II, Clause 2.6.3, Pg. No. 76	· Process interval data and frame it into the appropriate TOU periods for consumption and demand; for example, roll up 5 or 15 minute data intervals into hourly data.	· Process interval data and frame it into the appropriate TOU periods for consumption and demand; for example, roll up 15 minute data intervals into hourly data.
25	Vol. II, Clause 2.2.1, Pg. No. 30; Clause 2.2.2, Pg. No. 46; Clause 2.2.3, Pg. No. 59	Meter shall be supplied with separate battery backup for RTC and for display in case of power failure. The battery shall have a guaranteed life of 10 years.	Meter shall be supplied with separate battery backup for RTC and for display in case of power failure. The battery shall have a guaranteed life of 10 years from receipt of material at store.
26	Vol. II, Clause 2.2.2, Pg. No. 44	Load Control Phase and Neutral Disconnection on the following conditions:	Load Control Phase Disconnection on the following conditions:
27	Vol. II, Appendix F Table F4 & F15, Pg. No. 208, 213		Refer Annexure 1 to Amendment 1
28	Vol. II, Appendix B, Pg. No. 168	Web based interface with 5 Nos. of user license	Web Application Server
29	Vol. II, Clause 2.6.11, Pg. No. 80	· Ability for UI to set up alarm and event notifications that can be directed to a combination of configurable email addresses, cellular text messages or phone numbers.	The UI should also provide alerts based on user defined criteria which would be dispensed in the form of emails, portal alerts, mobile phones or text messages etc.

Sl. No	Clause Reference	Existing Provision	Amended Provision
30	Vol. II, Clause 4.19 , Pg. No. 97	MDAS, MDM, PLM, CFE and other software for analytics:	MDAS, MDM, PLM and other software for analytics:
31	Vol. II, Clause 5.2, Pg. No. 109	All software of AMI/MDM/PLM system provided by the Contractor, including the Operating system, Database and support software, shall comply with the industry-accepted software standards. In areas where these organizations have not yet set standards, the software shall comply with those widely accepted de- facto standards put forth by industry consortiums, such as OSF and X/Open. The Contractor shall commit to meet the "open systems" objective promoted by industry standards groups.	All software of AMI/MDM/PLM system provided by the Contractor, including the Operating system, Database and support software, shall comply with the industry-accepted software standards. In areas where these organizations have not yet set standards, the software shall comply with those widely accepted de- facto open standards put forth by industry consortiums, such as OSF and X/Open. The Contractor shall commit to meet the "open systems" objective promoted by industry standards groups.
32			
33	Vol. II, Clause 2.2.1 Pg. No. 27; Clause No.2.2.2, Pg. No. 43 ; Clause No 2.2.3, Page No 57	Injecting AC /DC high frequency / Current Signal in Neutral	DELETED
35	Vol. II Clause 2.2.1 Pg No. 26; Clause 2.2.2, Pg no 42; Clause 2.2.3, Pg no 56	Parameters: Billing parameters: Previous month's MD in kW and kVA, kWh, kVAh & kVARh (lead/lag), Signed Average power factor (lead/lag), Number of tamper count.	Parameters: Billing parameters: Previous month's MD in kW and kVA, kWh, kVAh & kVARh (lead/lag), Average power factor, Number of tamper count.
36	Vol II, Appendix F, table F5, Sl. No. 18, Pg. No. 209	Cumulative Tamper Count	Refer Annexure 1 to Amendment 1

Sl. No	Clause Reference	Existing Provision	Amended Provision
37	Vol II, Appendix F, table F10, Sl. No. 2, Pg. No. 210	Malfunctioning of Relay - restoration	Refer Annexure 1 to Amendment 1
38	Vol II, Appendix F, table F17, Pg. No. 215	Over voltage in R phase- Occurrence Over voltage in R phase - Restoration Over voltage in B phase- Occurrence Over voltage in B phase - Restoration Over voltage in Y phase- Occurrence Over voltage in Y phase - Restoration Low voltage in R phase- Occurrence Low voltage in R phase - Restoration Low voltage in B phase- Occurrence Low voltage in B phase - Restoration Low voltage in Y phase- Occurrence Low voltage in Y phase - Restoration	Over voltage in any phase- Occurrence Over voltage in any phase - Restoration Low voltage in any phase- Occurrence Low voltage in any phase - Restoration
39	Vol. II, Clause 2.2.3, Pg. No. 57 ;Clause 2.2.2, Pg. No. 42; Clause 2.2.1, Pg. No. 26	Load Survey / Interval Data: 35 (Power ON) days data to be recorded with 30 minutes integration period /17 days data to be recorded with 15 minutes integration period with date & time stamping for Active Energy (kWh), Apparent Energy (kVAh), Reactive Energy (kVARh), Average Voltage, Average Current, Signed Average Power Factor and Average Demand in kW & kVA. In addition cumulative mid night kWh, kVAh, kVARh (lead/lag) (00.00 Hrs) with date & time stamp shall also be recorded for 35 (Power ON) days.	Load Survey / Interval Data: 35 (Power ON) days data to be recorded with 30 minutes integration period /17 days data to be recorded with 15 minutes integration period with date & time stamping for Active Energy (kWh), Apparent Energy (kVAh), Reactive Energy (kVARh), Average Voltage, Average Current, Average Power Factor and Average Demand in kW & kVA. In addition cumulative mid night kWh, kVAh, kVARh (lead/lag) (00.00 Hrs) with date & time stamp shall also be recorded for 35 (Power ON) days.

Sl. No	Clause Reference	Existing Provision	Amended Provision
40	Vol. II, Clause 5.7, Pg. No. 116	A full fledge Document Management System (DMS) shall be provided. DMS should have web based user interface (accessible from any client through browser) hosted on a server with backend independent database. DMS should store and make available the all documentation of the project. System manuals for all software products (e.g., Operating System and Relational Database Software) and AMI/MDM/PLM applications shall be shall be available on DMS. It should have the facility for version control, access control, archiving etc. All access to the document should be based on the privileges assigned to the user. Completer user management system should be in built in the DMS.	DELETED
41	Vol. II, Clause 2.2.2, Pg. No. 42; Clause 2.2.3, Pg. No. 57	LED / LCD Indicator LED indicator for pulse/kWh. LED / LCD Indicator for Tamper, Disconnection, Earth leakage.	LED / LCD Indicator LED indicator for pulse/kWh. LED / LCD Indicator for Tamper, Disconnection.
43	Vol. II, Clause 5.8.1., Pg. No. 117	Through OPC Server A full OPC server compliant to the latest standard shall be provided in order to export real time data, alarms, historical data etc to the external system. OPC clients for WINDOWS and Linux shall also be supplied. If client software is based on the user system than at least five user licenses for each shall be provided. Server should be licensed accordingly.	DELETED

Sl. No	Clause Reference	Existing Provision	Amended Provision
44	Vol. II, Clause 5.8.2., Pg. No. 117	Through ODBC / JDBC Capability of export of AMI/MDM/PLM data to external system though ODBC and JDBC shall be provided. All system parameters in the real-time database including real time data, calculated data, application configuration parameters and application output shall be available through the ODBC interface. Limitation if any or pre-requisite on PC for use of this interface, shall be clearly defined. It shall be possible to export data to export data through SQL queries to external system.	DELETED
45	Vol. II, Clause 5.8., Pg. No. 117	INSERTED Clause No. 5.8.3.	5.8.3. Data exchange through WEB services: system should be enabled to exchange data through WEB services.
46	Vol. II, Clause 1.10.2. (20), Pg. No. 15	Carry out minor civil works as required for installation	Carry out minor civil works related to smart meter, DCU, any other field devices and hardware at Control Centre as required for installation
47	Vol. II, Clause 1.10.2. (37), Pg. No. 16	Installation of smart meters for new connections and integration of the same to the existing system till maintenance period	Integration of DLMS / COSEM based new smart meters / DCU procured separately in the provided MDAS / MDM system till maintenance period.
48	Vol. II, Clause 5.5.1., Pg. No. 116	Software utility, to take back-up of auxiliary memory files of server and workstation onto a user-selected archival device such as magnetic tape or SAN on Network, shall be installed. The backup utility shall allow for user selection of the files to be saved based on:	Software utility, to take back-up of auxiliary memory files of server and workstation onto a user-selected archival device such as magnetic tape or SAN on Network, shall be installed. Backup shall be maintained for a period of 3 years.The backup utility shall allow for user selection of the files to be saved based on:

Sl. No	Clause Reference	Existing Provision	Amended Provision
49	Vol. II, Clause 3.1., Pg. No. 88	Peak Load Management (PLM) shall include the following functionality: 1) Consumer category wise Time of Use (ToU) tariff on daily/weekly/monthly/ quarterly, etc shall be made available on the consumer portal. 2) Daily load forecasting for the project area on hourly basis. 3) Import hourly drawl schedule (to be made available by the Utility) for the project area. 4) Analysis of Surplus/ Deficit situation in daily drawl schedule. a) Based on the above analysis design demand response (DR) and demand side management programs. b) Command to be given to MDM for reduction of drawl limit for identified group of consumers. c) Notification for the modification in drawl limit to be sent to the consumers via SMS, email, etc as well as made available on the consumer portal. 5) On completion of demand response event drawl limit of the above consumers to be restored.	Peak Load Management (PLM) shall include the following functionality: 1) Consumer category wise Time of Use (ToU) tariff on daily/weekly/monthly/ quarterly, etc shall be made available on the consumer portal. 2) Daily load forecasting for the project area on hourly/weekly/monthly basis. 3) Import hourly drawl schedule (to be made available by the Utility) for the project area. 4) Load Profiles for time of day, day of week (weekday, Saturday/Sunday, holidays, festivals), monthly, annually across consumer meters, distribution transformer, feeder and system level. 5) Analysis of Surplus/ Deficit situation in daily drawl schedule. a) Based on the above analysis design demand response (DR) and demand side management programs. b) Command to be given to MDM for reduction of drawl limit for identified group of consumers. c) Notification for the modification in drawl limit to be sent to the consumers via SMS, email, etc as well as made available on the consumer portal. d) Segmentation of consumer based on past consumption pattern. e) Anticipation of load which may be high in future. f) Compare load profiles of different consumers (residential, commercial, HT and DT) g) Analytical process for incentivizing program for optimal ToU pricing. h) List of potential customers that may adopt or accept a 'Power

Sl. No	Clause Reference	Existing Provision	Amended Provision
50	Vol II, Clause 2.2.1, Pg No 36;Clause 2.2.2 Pg no 52; Clause 2.2.3, Pg no 65 (New paragraph is inserted)		**Meter Box Requirement** The meter box shall be intended to house one number Single Phase/Three Phase smart meter. The meter box complies with relevant Indian standard IS: 14772:2000/IS: 13410 with latest amendment. The Meter Box i.e base and cover shall be made of hot press moulded, unbreakable, high grade fire retardant Engineering Plastic (Acrylonitrile Butadiene Styrene) / Polycarbonate, with minimum thickness 2.0 mm having good di-electric and mechanical strength. Meter box shall be weather proof, capable to withstanding temperature of minimum 85° C.The thickness of the box shall be minimum 2.0 mm on all sides. The over all dimensions of the box shall be such that a minimum 30 mm clearance from left , right and top, 25 mm from front and 10mm from back side & 75 mm from meter terminals and bottom side shall be maintain in between meter and box surface. The box cover shall be fixed with concealed hinge. It would be open by at least 120 degrees. Soft rubber gasket shall be provided all around the periphery umption pattern. e) Anticipation of load which may be high in future. f) Compare load profiles of different consumers (residential, commercial, HT and DT) g) Analytical process for incentivizing program for optimal ToU pricing. h) List of potential customers that may adopt or accept a 'Power Reward' program 6) On completion of demand response event drawl limit of the above consumers to be restored. ll dimension of the meter box shall vary according to the different make of meters . However , it shall comply with the

Sl. No	Clause Reference	Existing Provision	Amended Provision
51	Vol. II, Clause 2.2., Pg. No. 23	2.2. Smart Meters	2.2. Smart Meters It is mandatory that Single Phase and Three Phase whole current meters shall be BIS 13779 marked and Three Phase CT operated meter shall be BIS 14697 marked. Contractor has to furnish valid BIS certification before supply of meters.
52	Vol. II Clause 2.2.1 Pg No. 36; Clause 2.2.2, Pg no 52; Clause 2.2.3, Pg no 65 (New paragraph is Inserted)		**Meter Marking Details** The following information shall be clearly and indelibly embossed (not printed) on the cover of the meter box except Sr.No. which should be indelibly printed with inkjet printing I. Purchase Order number and date. II. Year and month of manufacture III. Purchaser's Name IV. Guarantee : Years (as specified in GTP) V. Sign of Danger VI. Code name of manufacturer VII. Meter Box Sl.No
53	Vol. II, Clause 1.8., Pg. No. 13	The Bidder's proposal shall address all functional and performance requirements within this specification and shall include sufficient information and supporting documentation in order to determine compliance with this specification without further necessity for inquiries.	The Bidder's proposal shall address all functional and performance requirements within this specification and shall include sufficient information and supporting documentation in order to determine compliance with this specification without further necessity for inquiries. Bidder may provide all applications in one suite or multiple modules to meet all AMI and PLM Technical Specification requirements.

Sl. No	Clause Reference	Existing Provision	Amended Provision
54	Vol. II, Clause 1.6., Pg. No. 12	The detailed BoQ is given in Appendix. The Contractor has to carry out the detailed survey and collect the required data during survey. All other associated works/items described in the technical specifications for a viable and fully functional system is the responsibility of Contractor. The Contractor shall maintain the system for 5 year period from operational acceptance by WBSEDCL. During first of maintenance, contractor shall operate the system also. The Contractor shall also bear the cost of recurring charges for GPRS and static ISP connection till completion of maintenance period.	The detailed BoQ is given in Appendix. The Contractor has to carry out the detailed survey and collect the required data during survey. All other associated works/items described in the technical specifications for a viable and fully functional system is the responsibility of Contractor. The Contractor shall maintain the system for 5 year period from operational acceptance by WBSEDCL. During first of maintenance, contractor shall operate the system also. The Contractor shall also bear the cost of recurring charges for GPRS and static ISP connection till completion of maintenance period. The contractor shall establish the impact analysis of AMI and PLM functionalities, as required.

Annexure 1 to Amendment 1

2.6.13Performance Testing

Testing of AMI system shall be done as per the performance testing matrix attached below.

Testing of Data Availability – The tables show the expected data availability

S. No	Description	Check Duration	Data availability
1	Interval Read	Daily	80%
2	Interval Read	Weekly	85%
3	Interval Read	Monthly	90%
4	Loss of Supply & Tamper	Reporting % in 5 minute	80%
5	Loss of Supply & Tamper	Reporting % in 15 minute	85%

TABLE-F-4 NAME PLATE DETAILS

S.N.	Parameter
1	Meter serial no
2	Manufacturer name
3	Firmware version for meter
4	Meter type
5	Category
6	Current rating
7	Meter year of manufacture

TABLE-F-5 BILLING PROFILE

Sl. No.	Parameter	Unit
1	Billing date	
2	Average Power Factor for billing period	
3	Cumulative Energy, kWh	kWh
4	Cumulative Energy for TZ1	kWh
5	Cumulative Energy for TZ2	kWh

6	Cumulative Energy for TZ3	kWh
7	Cumulative Energy for TZ4	kWh
8	MD, kW	kW
9	MD kW for TZ1	kW
10	MD kW for TZ2	kW
11	MD kW for TZ3	kW
12	MD kW for TZ4	kW
13	MD, kVA	kVA
14	MD, kVA for TZ1	kVA
15	MD, kVA for TZ2	kVA
16	MD, kVA for TZ3	kVA
17	MD, kVA for TZ4	kVA

TABLE-F-10 CONTROL EVENTS

S.N.	Parameter	Unit
1	Malfunctioning of relay - Occurrence	
2	Connect	
3	Disconnect	

TABLE-F-15 NAME PLATE DETAILS

S.N.	Parameter
1	Meter serial no
2	Manufacturer name
3	Firmware version for meter
4	Meter type
5	Category
6	Current rating
7	Meter year of manufacture

TABLE-F-17 VOLTAGE RELATED EVENTS

S.N.	Parameter	Unit
1	Over voltage in any phase- Occurrence	
2	Over voltage in any phase - Restoration	
3	Low voltage in any phase- Occurrence	
4	Low voltage in any phase - Restoration	

Spec.No: **Schedule - 1**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

(SCHEDULE OF RATES AND PRICES)

Bidder's Name and Address (Sole Bidder) :

Name
Address

To:
West Bengal State Electricity Distribution Company Limited

Tele-fax: #
Phone: +91- #
email :

Ex-Works Prices of Plant & Equipment

All Prices are in Indian Rupees.

SI. No.	Item Description	Type & Designation	Unit	Quantity	nit Ex-works pri	Total Ex-works price	de of Transaction (direct or bought
1	2	3	4	5	6	7=(5X6)	8
A	**Application Software***						
A.1	Meter Data Acquisition software(MDAS)		Lot	1			
A.2	Meter Data Management software (MDM)		Lot	1			
A.3	Peak Load Management software(PLM)		Lot	1			
A.4	Web based interface with 5 Nos. of user license		Lot	1			
A.5	Consumer portal		Lot	1			
A.6	SMS Gateway		Lot	1			
	Sub Total for Application Software						
B	**Data Archiving Software***						
B.1	Data archiving and SAN management Software		Lot	1			
	Sub Total for Data Archiving Software						
C	**Network Management Software***						
C.1	Centralized network management software along with patch management & Identity management		Lot	1			
C.2	Antivirus software for all machines in control centre		Lot	1			
	Sub Total for Network Management Software						
D	**Hardware for application**						
D.1	Application Server suitable for MDAS, MDM, PLM along with operating system*.		Set@	2			
D.2	GPS based time facility along with digital display for time and frequency.		Set	1			
D.3	Web Server & consumer portal for access		Set	2			
	Sub Total for Hardware for Application						
E	**Hardware for storage**						
E.1	SAN based storage for storing 5300 consumer data for 2 Years with 100% expansion capacity		No	1			
E.2	Data archiving Server		Nos.	2			
	Sub Total for Hardware for Storage						
F	**Hardware for network Management**						
F.1	Network Management server with patch & identity management		Set	1			
F.2	Centralized management console with single monitor		Set	1			
	Sub Total for Hardware for Network Management						
G	**Workstation Consoles**						
G.1	Workstation Consoles with dual 24" monitor along with Operating System and license		Nos.	2			
	Sub Total for workstation consoles						
H	**Network Hardware**						

H.1	Firewall with Network-based intrusion prevention system (NIPS)Minimum 8 Ethernet ports (1Gbps) and 4		Nos.	2			
H.2	Router with Minimum 8 Ethernet ports (1Gbps) and 4 Fiber Optic Ports		Nos.	2			
H.3	LAN Switch (24 port 1000 / 100 / 10 Mbps , Layer 3 switching, 8 Ethernet ports (1Gbps))		Nos.	2			
	Sub Total for Network Hardware						
I	**Printers**						
I.1	Color laser printer		No	1			
I.2	Black and White laser printer Multifunction devices		No	1			
	Sub Total For Printers						
J	**Furniture**						
J.1	Table for Workstation		Nos	3			
J.2	Table for Printers		Nos	2			
J.3	Swivel Chairs		Nos	5			
	Sub Total for Furniture						
K	**Display**						
K.1	55" LED Display with 2 nos. HDMI port, USB port		No	1			
	Sub Total for Display						
L	**Smart Energy Meters**						
L.1	Single Phase Smart Meter		Nos	5069			
L.2	Three phase Smart Meter		Nos	191			
L.3	CT Operated Three phase meter (except CT)		Nos	15			
	Sub Total for Smart Energy Meters						
M	**Data Concentrator Unit****						
M.1	Data Concentrator Unit (DCU) as required for all type of meters(Single Phase smart meter, three phase smart meter , CT operated smart meter, AMR meter etc)		Lot	1			
	Sub Total for Data Concentrator Unit						
N	**Site Items**						
N.1	Hand Held Unit (HHU)		Nos.	5			
N.2	Meter Box		Nos.	5275			
N.3	FRP Board		Nos.	5275			
	Sub Total for Site Items						
	Total for Direct Items						
	Total for Boughtout Items						
	TOTAL EX-WORKS PRICE CHARGES						

1) The item-wise break-down of price components for various items is required to be furnished by the bidder. For the said purpose, the item-wise break-down together with Bill of Quantities (BOQ) shall be finalised during First S
2) The actual quantity in Lot will be calculated based on the quantity as mentioned in specification.
* To be provided with valid Licence
@ One set consists of all hardware required for applications
** DCU shall receive information through PLC/RF from all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS to MDAS at control centre

Date :
Place :

Signature:
Printed Name :
Designation :
Common Seal

Spec.No: **Schedule - 2**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

(SCHEDULE OF RATES AND PRICES)

Bidder's Name and Address (Sole Bidder) :

Name
Address

F&I Charges

To:
West Bengal State Electricity Distribution Company Limited

Tele-fax: #
Phone: +91- #

All Prices are in Indian Rupees.

SI. No.	Item Description	Type & Designation	Unit	Quantity	Unit price	Total Price
1	2	3	4	5	6	7=(5X6)
A	**Application Software***					
A.1	Meter Data Acquisition software(MDAS)		Lot	1		
A.2	Meter Data Management software (MDM)		Lot	1		
A.3	Peak Load Management software(PLM)		Lot	1		
A.4	Web based interface with 5 Nos. of user license		Lot	1		
A.5	Consumer portal		Lot	1		
A.6	SMS Gateway		Lot	1		
	Sub Total for Application Software					
B	**Data Archiving Software***					
B.1	Data archiving and SAN management Software		Lot	1		
	Sub Total for Data Archiving Software					
C	**Network Management Software***					
C.1	Centralized network management software along with patch management & Identity management		Lot	1		
C.2	Antivirus software for all machines in control centre		Lot	1		
	Sub Total for Network Management Software					
D	**Hardware for application**					
D.1	Application Server suitable for MDAS, MDM, PLM along with operating system*.		Set@	2		
D.2	GPS based time facility along with digital display for time and frequency.		Set	1		
D.3	Web Server & consumer portal for access		Set	2		
	Sub Total for Hardware for Application					
E	**Hardware for storage**					
E.1	SAN based storage for storing 5300 consumer data for 2 Years with 100% expansion capacity		No	1		
E.2	Data archiving Server		Nos.	2		
	Sub Total for Hardware for Storage					
F	**Hardware for network Management**					
F.1	Network Management server with patch & identity management		Set	1		
F.2	Centralized management console with single monitor		Set	1		
	Sub Total for Hardware for Network Management					
G	**Workstation Consoles**					
G.1	Workstation Consoles with dual 24" monitor along with Operating System and license		Nos.	2		
	Sub Total for workstation consoles					
H	**Network Hardware**					
H.1	Firewall with Network-based intrusion prevention system (NIPS)Minimum 8 Ethernet ports (1Gbps) and 4 Fiber Optic Ports		Nos.	2		
H.2	Router with Minimum 8 Ethernet ports (1Gbps) and 4 Fiber Optic Ports		Nos.	2		

H.3	LAN Switch (24 port 1000 / 100 / 10 Mbps , Layer 3 switching, 8 Ethernet ports (1Gbps))		Nos.	2		
	Sub Total for Network Hardware					
I	**Printers**					
I.1	Color laser printer		No	1		
I.2	Black and White laser printer Multifunction devices		No	1		
	Sub Total For Printers					
J	**Furniture**					
J.1	Table for Workstation		Nos	3		
J.2	Table for Printers		Nos	2		
J.3	Swivel Chairs		Nos	5		
	Sub Total for Furniture					
K	**Display**					
K.1	55" LED Display with 2 nos. HDMI port, USB port		No	1		
	Sub Total for Display					
L	**Smart Energy Meters**					
L.1	Single Phase Smart Meter		Nos	5069		
L.2	Three phase Smart Meter		Nos	206		
	Sub Total for Smart Energy Meters					
M	**Data Concentrator Unit****					
M.1	Data Concentrator Unit (DCU) as required for all type of meters(Single Phase smart meter, three phase smart meter , CT operated smart meter, AMR meter etc)		Lot	1		
	Sub Total for Data Concentrator Unit					
N	**Site Items**					
N.1	Hand Held Unit (HHU)		Nos.	5		
N.2	Meter Box		Nos.	5275		
	Sub Total for Site Items					
	TOTAL F&I CHARGES					

1) The item-wise break-down of price components for various items is required to be furnished by the bidder. For the said purpose, the item-wise break-down together with Bill of Quantities (BOQ) shall be finalised

2) The actual quantity in Lot will be calculated based on the quantity as mentioned in specification.

* To be provided with valid Licence

@ One set consists of all hardware required for applications

** DCU shall receive information through PLC/RF from all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS to MDAS at control centre

Date :
Place :

Signature:
Printed Name :
Designation :
Common Seal

Spec.No: **Schedule - 3**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

(SCHEDULE OF RATES AND PRICES)

Bidder's Name and Address (Sole Bidder) :

Name
Address

Installation Charges

To:
West Bengal State Electricity Distribution Company l

Tele-fax: #
Phone: +91- #
email :

All Prices are in Indian Rupees.

SI. No.	Item Description	Type & Designation	Unit	Quantity	Unit price	Total Price
1	2	3	4	5	6	7=(5X6)
A	**Application Software***					
A.1	Meter Data Acquisition software(MDAS)		Lot	1		
A.2	Meter Data Management software (MDM)		Lot	1		
A.3	Peak Load Management software(PLM)		Lot	1		
A.4	Web based interface with 5 Nos. of user license		Lot	1		
A.5	Consumer portal		Lot	1		
A.6	SMS Gateway		Lot	1		
	Sub Total for Application Software					
B	**Data Archiving Software***					
B.1	Data archiving and SAN management Software		Lot	1		
	Sub Total for Data Archiving Software					
C	**Network Management Software***					
C.1	Centralized network management software along with patch management & Identity management		Lot	1		
C.2	Antivirus software for all machines in control centre		Lot	1		
	Sub Total for Network Management Software					
D	**Hardware for application**					
D.1	Application Server suitable for MDAS, MDM, PLM along with operating system*.		Set@	2		
D.2	GPS based time facility along with digital display for time and frequency.		Set	1		
D.3	Web Server & consumer portal for access		Set	2		
	Sub Total for Hardware for Application					
E	**Hardware for storage**					
E.1	SAN based storage for storing 5300 consumer data for 2 Years with 100% expansion capacity		No	1		
E.2	Data archiving Server		Nos.	2		
	Sub Total for Hardware for Storage					
F	**Hardware for network Management**					
F.1	Network Management server with patch & identity management		Set	1		
F.2	Centralized management console with single monitor		Set	1		
	Sub Total for Hardware for Network Management					
G	**Workstation Consoles**					
G.1	Workstation Consoles with dual 24" monitor along with Operating System and license		Nos.	2		

	Sub Total for workstation consoles					
H	**Network Hardware**					
H.1	Firewall with Network-based intrusion prevention system (NIPS)Minimum 8 Ethernet ports (1Gbps) and 4 Fiber Optic Ports		Nos.	2		
H.2	Router with Minimum 8 Ethernet ports (1Gbps) and 4 Fiber Optic Ports		Nos.	2		
H.3	LAN Switch (24 port 1000 / 100 / 10 Mbps , Layer 3 switching, 8 Ethernet ports (1Gbps))		Nos.	2		
	Sub Total for Network Hardware					
I	**Printers**					
I.1	Color laser printer		No	1		
I.2	Black and White laser printer Multifunction devices		No	1		
	Sub Total For Printers					
J	**Furniture**					
J.1	Table for Workstation		Nos	3		
J.2	Table for Printers		Nos	2		
J.3	Swivel Chairs		Nos	5		
	Sub Total for Furniture					
K	**Display**					
K.1	55" LED Display with 2 nos. HDMI port, USB port		No	1		
	Sub Total for Display					
L	**Smart Energy Meters**					
L.1	Single Phase Smart Meter		Nos	5069		
L.2	Three phase Smart Meter		Nos	206		
	Sub Total for Smart Energy Meters					
M	**Data Concentrator Unit****					
M.1	Data Concentrator Unit (DCU) as required for all type of meters(Single Phase smart meter, three phase smart meter , CT operated smart meter, AMR meter etc)		Lot	1		
	Sub Total for Data Concentrator Unit					
N	**Site Items**					
N.1	Hand Held Unit (HHU)		Nos.	5		
N.2	Meter Box		Nos.	5275		
	Sub Total for Site Items					
	TOTAL INSTALLATION CHARGES					

1) The item-wise break-down of price components for various items is required to be furnished by the bidder. For the said purpose, the item-wise break-down together with Bill of Quantities
2) The actual quantity in Lot will be calculated based on the quantity as mentioned in specification.
* To be provided with valid Licence
@ One set consists of all hardware required for applications
** DCU shall receive information through PLC/RF from all smart meters(Single phase, Three phase and CT operated) and communicate on GPRS to MDAS at control centre

Date :
Place :

Signature
Printed Name :
Designation :
Common seal

Spec.No: **Schedule - 4(a)**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

(SCHEDULE OF RATES AND PRICES: TRAINING CHARGES)

Bidder's Name and Address (Sole Bidder) :

Name
Address

To:
West Bengal State Electricity Distribution Company Limited

Tele-fax: #
Phone: +91- #
email :

Training Charges for Training to be imparted in India

All Prices are in Indian Rupees.

SN	Description	Location	Mandays	Total Training Charges
1	2	3	5	6
A	**Training at Site**			
A.1	Smart Meter, DCU and associated Communication		25	
A.2	MDAS & MDM, PLM database & User Interface		15	
A.3	Computer System H/W & Software		15	
B	**Training at Contractor facility**			
B.1	MDAS & MDM, PLM & Protocol		25	
B.2	Database & Display		15	
B.3	Application s/w (MDA,MDM,PLM)		20	
	TOTAL AMOUNT			

To and fro charges and accommodation for the Instructor (Trainer) and Training material for the Trainees shall be included in the prices quoted by the

Date :
Place :

Signature :
Printed Name :
Designation :
Common Seal

Spec.No: **Schedule - 4(b)**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

(SCHEDULE OF RATES AND PRICES : MAINTENANCE CHARGES)

Bidder's Name and Address (Sole Bidder) :

Name
Address

To:
West Bengal State Electricity Distribution Company Limited

Tele-fax: #
Phone: +91- #
email :

Maintenance Charges

All Prices are in Indian Rupees.

SN	Description	Unit	Qty.	Total Charges
1	2	3	4	5
(i)	Maintenance & operation of complete AMI & PLM System for first			
(ii)	Maintenance of complete AMI & PLM System for Second year after			
(iii)	Maintenance of complete AMI & PLM System for Third year after			
(iv)	Maintenance of complete AMI & PLM System for Fourth year after			
(v)	Maintenance of complete AMI & PLM System for Fifth year after			
	TOTAL AMOUNT			

Date :
Place :

Signature :
Printed Name :
Designation :
Common Seal

Spec. No: **Schedule - 5**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

SUMMARY OF TAXES & DUTIES APPLICABLE ON PLANT & EQUIPMENT

Bidder's Name and Address (Sole Bidder) :

Name :
Address :

To:
West Bengal State Electricity Distribution Company Limited

Tele-fax: #
Phone: +91- #
email :

Sl. No.	Item Nos.		Total Price (INR)
1	**TOTAL EXCISE DUTY**		
	Total Excise Duty for direct transaction between the Contractor and the Employer		
	Rate of Excise Duty for Direct items indicated in Sch-1		
2	**TOTAL SALES TAX**		
	Total Sales Tax for direct transaction between the Contractor and the Employer		
	Amount on which Sales Tax is applicable [only ex-works price]		
	Excise duty on this amount @ 0%		
	Rate of Sales Tax		
3	**TOTAL VAT**		
	Total VAT for direct transaction between the Contractor and the Employer		
	Amount on which VAT is applicable [only ex-works price]		
	Excise duty on this amount @ 0%		
	Rate of VAT		
4	**TOTAL OCTROI**		
	Total Octroi as applicable for destination site/state on all items of supply, as per the		
	Amount on which Octroi is applicable		
5	**TOTAL ENTRY TAX**		
	Total Entry Tax as applicable for destination site/state on all items of supply, as per the		
	Amount on which Entry Tax is applicable		
6	**TOTAL OTHER TAXES & DUTIES**		
	Total Others levies payable in India (please specify) as applicable for destination		
	Amount on which Other Taxes & Duties are applicable		
	GRAND TOTAL [1+2+3] *Above Grand Total does not include Octroi, Entry Tax , Other Taxes & Duties quoted by*		**Plus Octroi, Entry Tax , Other Taxes & Duties quoted by**

Note : The reimbursement of Excise Duty, Sales Tax/VAT and other levies as per Sl. No. 1, 2 & 3 above subject to provision of ITB shall be only against those items

Signature:
Date :
Printed Name :
Place :
Designation :
Common Seal

Spec. No: **Schedule - 6**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

(GRAND SUMMARY)

Bidder's Name and Address (Sole Bidder) :

Name :
Address :

To:
West Bengal State Electricity Distribution Company Limited

Tele-fax: #
Phone: +91- #
email :

Sl. No.	Description	Total Price (INR)
1	**TOTAL SCHEDULE NO. 1**	
	Ex-works price of Plant and Equipment	
2	**TOTAL SCHEDULE NO. 2**	
	Local Transportation, Insurance and other Incidental Services (F&I	
3	**TOTAL SCHEDULE NO. 3**	
	Installation Charges	
5	**TOTAL SCHEDULE NO. 4-a**	
	Training Charges	
6	**TOTAL SCHEDULE NO. 4-b**	
	Maintenance Charges	
7	**TOTAL SCHEDULE NO. 5**	
	Taxes and Duties	Plus Octroi, Entry Tax , Other Taxes & Duties quoted by bidder at
	GRAND TOTAL [1+2+3+4+5+6+7]	**Plus Octroi, Entry Tax , Other Taxes & Duties quoted by bidder**

Signature :
Printed Name :
Designation :
Common seal

Date :
Place :

Spec.No: **Schedule - 6 After Discount**

Implementation of Smart Grid Elements (Pilot) in West Bengal at Siliguri

(GRAND SUMMARY : AFTER DISCOUNT)

Bidder's Name and Address (Sole Bidder) :

Name :
Address :

To:
West Bengal State Electricity Distribution Company Limited

Tele-fax: #
Phone: +91- #
email :

Sl. No.	Description	Total Price (INR)
1	**TOTAL SCHEDULE NO. 1**	
	Ex-works price of Plant and Equipment	
2	**TOTAL SCHEDULE NO. 2**	
	Local Transportation, Insurance and other Incidental Services (F & I	
3	**TOTAL SCHEDULE NO. 3**	
	Installation Charges	
5	**TOTAL SCHEDULE NO. 4-a**	
	Training Charges	
6	**TOTAL SCHEDULE NO. 4-b**	
	Maintenance Charges	
7	**TOTAL SCHEDULE NO. 5**	
	Taxes and Duties	Plus Octroi, Entry Tax , Other Taxes & Duties quoted by bidder at
	GRAND TOTAL [1+2+3+4+5+6+7]	**Plus Octroi, Entry Tax , Other Taxes & Duties quoted by bidder at**

Signature
Date : **Printed Name :**
Place : **Designation :**
Common seal

This letter of discount is optional. Bidder may / may not offer any discount.

Spec.No: **Letter of Discount**

LETTER OF DISCOUNT

To:

West Bengal State Electricity Distribution Company Limited
Station Feeder Rd, Pradip Nagar, Siliguri, West Bengal 734001
Tele-fax: #
Phone: +91- #
email : rm.darjeeling@gmail.com

Subject : Implementation of Smart Grid Elements (Pilot) in West Bengal State Electricity Distribution Company Limited at Siliguri

Dear Sir

With reference to the subject tender, we hereby offer unconditional discount on the prices quoted by us as per details given here below :

1	**Discount on lum-sum basis on total price quoted by us without Taxes & Duties.** [The discount shall be		
2	**Discount on percent basis on total price quoted by us without Taxes & Duties.** [The discount shall be		
3	**Discount on lum-sum basis on the Schedules as given below :** [The discount shall be proportionately applicable on		
	Schedule-1 : Ex works prices (Direct Only)	In Rs.	
	Schedule-1 : Ex works prices (Bought Out Only)	In Rs.	
	Schedule-2 : Freight & Insurance	In Rs.	
	Schedule-3 : Installation Charges	In Rs.	
	Schedule-4a: Training Charges	In Rs.	
	Schedule-4b: Maintenance Charges	In Rs.	
4	**Discount on percent basis on the Schedules as given below :** [The discount shall be proportionately applicable on all		
	Schedule-1 : Ex works prices (Direct Only)	In Percent (%)	
	Schedule-1 : Ex works prices (Bought Out Only)	In Percent (%)	
	Schedule-2 : Freight & Insurance	In Percent (%)	
	Schedule-3 : Installation Charges	In Percent (%)	
	Schedule-4a: Training Charges	In Percent (%)	
	Schedule-4b: Maintenance Charges	In Percent (%)	

Discount(s) offered at sl. No. 1 to 4 can accounted for in the respective items of the Schedules.

Please consider this letter of discount as the integral part of our price bid.

Thanking you, we remain,

Yours faithfully,
For and on behalf of

Date :
Place :

Signature :
Printed Name :
Designation :
Common seal :

Details of Octroi

Sl No.	Description of Items	Amount on which	Rate of	Octroi
(1)	(2)	(3)	(4)	(5) =(3) x (4)
	If applicable extra to Purchasers account			
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
	Total			

Details of Entry Tax

Sl No.	Description of Items	Amount on which	Rate of	Entry Tax
(1)	(2)	(3)	(4)	(5) =(3) x (4)
	If applicable extra to Purchasers account			
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
	Total			

Details of Other Taxes & Duties

Sl No.	Description of Items	Amount on which	Descripti	Rate of	Amount of
(1)	(2)	(3)	(4)	(5)	(6) =(3) x (5)
	If applicable extra to Purchasers account				
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
	Total				